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A COMPARATIVE ANALYSIS OF CREATIVE AND INTELLIGENT BEHAVIOR OF ELEMENTARY SCHOOL CHILDREN WITH DIFFERENT SOCIO-ECONOMIC BACKGROUNDS. FINAL PROGRESS REPORT.
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TO TEST HYPOTHESES RELATED TO THE CREATIVE THINKING OF CHILDREN FROM DIFFERENT SOCIO-ECONOMIC BACKGROUNDS, TESTS OF CREATIVITY AND OF INTELLIGENCE WERE ADMINISTERED TO 722 FIRST, THIRD, AND FIFTH GRADE CHILDREN FROM DIFFERENT SOCIO-ECONOMIC BACKGROUNDS. CHILDREN OF EACH SEX IN EACH GRADE WERE TESTED FOR VERBAL INTELLIGENCE (AS MEASURED BY THE PEABODY PICTURE VOCABULARY TEST), AND CREATIVITY (AS MEASURED BY THE TORRANCE TESTS OF CREATIVE THINKING, FIGURAL FORM A AND VERBAL FORM B). THE TORRANCE TEST SCORES HAD GREATEST RELATIONSHIP TO THE COMBINED INDEPENDENT VARIABLES (SEX, INTELLIGENCE, AND SOCIO-ECONOMIC BACKGROUND) AT THE EARLIEST YEARS OF SCHOOL. THESE RELATIONSHIPS DECREASED AS THE AGE AND THE GRADE LEVEL OF CHILDREN INCREASED. WHILE SIGNIFICANT RELATIONSHIPS WERE FOUND BETWEEN SOCIO-ECONOMIC STATUS AND CREATIVITY WHEN OTHER VARIABLES WERE HELD CONSTANT, THESE RELATIONSHIPS DID NOT FOLLOW A CONSISTENT PATTERN. THE INCIDENCE OF THESE SIGNIFICANT RELATIONSHIPS TENDED TO DECREASE WITH INCREASING AGE AND GRADE LEVEL. THESE FINDINGS INDICATED THAT THE TORRANCE TEST MATERIALS WERE RELATIVELY NEUTRAL TOWARD DIFFERENT SOCIO-ECONOMIC CLASSES. SCORES WERE COMPLETELY UNCORRELATED WITH INTELLIGENCE TESTS, CONFIRMING THE IMPORTANCE OF EMPHASIZING CREATIVITY AS A SEPARATE DIMENSION OF THINKING. (AUTHOR)

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ABSTRACT

A COMPARATIVE ANALYSIS OF CREATIVE AND INTELLIGENT BEHAVIOR OF ELEMENTARY SCHOOL CHILDREN WITH DIFFERENT SOCIO-ECONOMIC BACKGROUNDS

by

Anita O. Solomon

Purpose: Few studies have explored the creative thinking of children from different socio-economic backgrounds. With this nation heavily dependent on the imagination and originality of its creative individuals, increased knowledge and understanding of creativity--and of its multiple relationships with socio-economic status, intelligence, sex, age, and grade level--seemed essential in order to aid in developing methods of recognizing and fostering creative thinking early in life. The purpose of this study was to determine and to analyze data on such relationships.

Procedures: In order to test hypotheses related to the problem, tests of creativity and of intelligence were administered in selected District of Columbia elementary schools to 722 first, third, and fifth grade children from different socio-economic backgrounds. Children of each sex in each grade were tested for verbal intelligence, as measured by the Peabody Picture Vocabulary Test; and for

creativity, as measured by the Torrance Tests of Creative Thinking, Figural Form A and Verbal Form A, formerly called the Minnesota Tests of Creative Thinking. The figural tests included dimensions of fluency, flexibility, elaboration, and composite scores on creativity. The verbal tests included all these dimensions except elaboration.

Results: The Torrance test scores had greatest relationship to the combined independent variables (sex, intelligence, and socio-economic background) at the earliest years of school. These relationships decreased as the age and the grade level of children increased.

While significant relationships were found between socio-economic status and creativity when other variables were held constant, these relationships did not follow a consistent pattern; in some instances they favored the advantaged and in other instances they favored the deprived. The incidence of these significant relationships tended to decrease with increasing age and grade level. These findings also indicated that the Torrance test materials, unlike the standard intelligence and achievement tests, were relatively neutral toward different socio-economic classes.

When significant, the test results favored the females over the males, when other variables were held constant, and there were greater instances of these significant differences at the third grade level on both verbal and figural tests.

Scores were completely uncorrelated with intelligence tests, as measured by the Peabody Picture Vocabulary Test, confirming the importance of emphasizing creativity as a separate dimension of thinking.

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This study could not have been carried out without the interest and advice of many individuals. This preface provides an opportunity to express the writer's appreciation for the guidance and assistance given by the sponsors of her research, Dr. John W. Devor, Chairman of the Department of Education, Dr. Edith H. Grotberg, Dr. Paul D. Leedy, and Dr. Samuel E. Burr, Jr.

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The writer is grateful for the permission by Dr. Margaret C. Cooper, Assistant to the Assistant Superintendent, Department of Research, Budget and Legislation, and Dr. Dorothy N. Johnson, Assistant Superintendent of Schools, Board of Education, Washington, D.C., to test and conduct research in the District of Columbia public schools. The research has profited by the interest and support given by

the principals of the six elementary schools participating in the study: Mrs. Roberta Barnes, Lafayette School; Miss Miriam Kaufmann, Murch School; Mr. Max Rosenfeld, Petworth School; Mr. Thomas Hiltz, Thomson School; Mrs. Edna Drayton, Simmons School; and Mr. Del Foster, McLean Gardens School. The cooperation and assistance of the thirty elementary school teachers in the above schools is deeply appreciated as well as the participation of more than seven hundred children in the testing program.

The writer is especially indebted to Dr. E. Paul Torrance, originator of the Torrance Tests of Creative Thinking, who has been most generous with his time and materials. Dr. Torrance has never hestitated to answer questions arising in the course of the research and the writer has profited by his counsel.

The writer consulted with three professional people on scoring of the Torrance Tests of Creative Thinking. Having conducted studies with the Torrance materials, Mrs. Margaret J. Sheldon, Superintendent, Arlington Public Schools, Arlington, Virginia; Dr. James Raths, Director, Educational Research and Field Services, the University of Maryland; and Dr. Louise Berman, Director, Association for Supervision and Curriculum Development, National Education Association, Washington, D.C., were helpful with suggestions on proper scoring procedures.

Most useful advice on statistical computation and measurement was given by Mr. Dhirendra Ghosh, Department of Mathematics, The Catholic University of America. Computer assistance was provided by the staff of the National Bureau of Standards, with special technical aid given by Mr. Brian Joiner.

The writer expresses her thanks to the following people who throughout the study aided in the testing, scoring, and clerical duties involved in making this a successful project: Mrs. Adele Bindeman, Mrs. Mildred Winer, Mrs. Jean Meyer, Mrs. Nona Nye, Mrs. Ann Petri, Mrs. Janet Nurick, Mr. Joques Prandoni, and Mrs. Leona Feathers.

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CHAPTER I

INTRODUCTION

Few studies have explored the creative thinking of children from different socio-economic backgrounds. With this nation heavily dependent on the imagination and originality of its creative individuals, increased knowledge and understanding of creativity--and of its multiple relationships with socio-economic status, intelligence, sex, age, and grade level--seemed essential in order to aid in developing methods of recognizing and fostering creative thinking early in life.

Statement of the Problem

The purpose of this study was to determine and to analyze the various relationships between performance on tests of creative ability and tests of intelligence by first, third, and fifth grade elementary school children of different socio-economic backgrounds.

The Subproblems

Subproblem 1. Could the educator predict the creative ability of culturally advantaged children and of culturally deprived children more accurately in the earlier years of school than in the later years; i.e., in the first grade more accurately than in the third grade, and in the third grade more accurately than in the fifth grade?

Subproblem 2. At three grade levels, what effect would the intelligence of children have on the children's creativity scores, when the effects of two other variables (sex and socio-economic status) were held constant?

Subproblem 3. At three grade levels, what effect would the socio-economic backgrounds of children have on the children's creativity scores, when the effects of two other variables (sex and intelligence) were held constant?

Subproblem 4. At three grade levels, what effect would the sex of children have on the children's creativity scores when the effects of two other variables (intelligence and socio-economic background) were held constant?

Delimitations

1. The research was not a longitudinal study. The same children were not studied on the three elementary grade levels.

2. This study did not attempt to determine the causes of the hypothesized decrease of relationships between the combined variables (sex, intelligence, and socio-economic background) and creativity in the early school years.

3. Only children in the first, third, and fifth grades of culturally advantaged and culturally deprived socio-economic backgrounds were studied.

4. No attempt was made to deal with school policy.

5. Teachers were not asked to perform tasks on this study, that is, to make ratings, judgments, or descriptions of the children.

6. Only tests of intelligence and of creativity were used as indicators of the child's intelligence and his creativity in this study. The test of intelligence was the Peabody Picture Vocabulary Test which was "designed to provide a well-standardized estimate of the subject's verbal intelligence through measuring his hearing vocabulary."[1] The test of creativity in this study was the Torrance Tests of Creative Thinking,[2] formerly called the Minnesota Tests of Creative Thinking.[3]

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[1] Lloyd M. Dunn, Manual, Peabody Picture Vocabulary Test (Minneapolis: American Guidance Service, Inc., 1959), p. 25.

[2] E. Paul Torrance, Torrance Tests of Creative Thinking: Directions Manual and Sorting Guide (Princeton, New Jersey: Personnel Press, Inc., 1966). Separate manuals for Verbal Test Booklet A, Verbal Test Booklet B, Figural Test Booklet B, Figural Test Booklet A, and Figural Test Booklet B.

[3] Bureau of Educational Research, University of Minnesota, Minnesota Tests of Creative Thinking, Non-Verbal Form A and Verbal Form A (Minneapolis, Minnesota: University of Minnesota, 1962), pp. 1-37; pp. 1-38.

7. The schools in this study, while incorporating tasks for stimulating the creative capacity in the individual, did not have a systematic program for developing creativity. During the course of this study, however, the Murch and Lafayette Elementary Schools, two of the schools participating in this study, took part in the programs of Project 370, School and Community Action Research,[4] which had as a major goal the improvement of instruction and the communication of innovations with schools in the District of Columbia. As one of its planned procedures, the project proposed to "identify creativity in students through various new interview scales (i.e., Torrance)."[5] The staff conducting this program consulted with the author and agreed to coordinate their research results on the seventh grade level with those of the author. The coordination of the results of Project 370 with those of the author will not be reported in this research.

Definitions of Terms

Creative thinking. Creative thinking in this research referred to E. Paul Torrance's definition:

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[4] P.L. 89-10, Title III, Planning Grant, "Application for Federal Grant to Plan a Supplementary Educational Center and Services; School and Community Action Research, Improving Instruction and Sharing Innovations with all Schools of the District of Columbia," Board of Education of the District of Columbia, February 8, 1966.

[5] *Ibid.*, Abstract.

> As taking place in the process of sensing difficulties, problems, gaps in information, missing elements; making guesses or formulating hypotheses about these deficiencies; testing these guesses and possibly revising and retesting them; and finally in communicating the results.[6]

Torrance Tests of Creative Thinking.[7] This battery of tests was designed by E. Paul Torrance, formerly with the Bureau of Educational Research, University of Minnesota, now Chairman of the Department of Educational Psychology, University of Georgia, to measure creative ability, sometimes called divergent thinking abilities. The tests, derived from Guilford's factor analytic studies of creative adults,[8] were designed to elicit specific creative thinking abilities which had been shown by Guilford to be related to the creative process. These tests had been modified by Torrance for use with children in the early school years. While still in various stages of revision and validation, they had been applied to large numbers of children, so that norms and other data regarding them were available. (See Criteria for Admissibility of Data section of this paper.)

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[6] E. Paul Torrance, Rewarding Creative Behavior: Experiments in Classroom Creativity (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965), p. 8.

[7] Torrance, Torrance Tests of Creative Thinking, loc. cit.

[8] J. P. Guilford, "A Factor-Analytic Study of Creative Thinking Abilities," Psychometrika, XIX (December, 1954), 279-311.

As far as could be ascertained, there were no other tests designed specifically to assess creative thinking in children about which large amounts of data had been gathered. The thinking abilities sought in this study were the following:

1. Ideational fluency. This term was used by Torrance to refer to the ability of a person to be fluent in the production of ideas "where free expression is encouraged and where quality is not evaluated."[9] This trait was the ability to produce ideas to fulfill certain requirements in limited time. (Ideational fluency was one of eight creative abilities discovered by Guilford. The others were association fluency, spontaneous flexibility, adaptive flexibility, originality, elaboration, sensitivity, and curiosity.[10])

2. Flexibility. Flexibility was the "ability to shift from one idea to another."[11] Torrance borrowed the term from Guilford, who in 1950 hypothesized that creative thinkers were flexible thinkers. They readily deserted old ways of thinking and moved in new directions.

3. Originality. Originality was defined as "the ability to produce uncommon ideas."[12] Torrance's

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[9] Torrance, Rewarding Creative Behavior, op. cit., p. 298.

[10] Guilford, op. cit., pp. 297-311.

[11] Ibid.

[12] Ibid., p. 303.

measurement of originality was the same as that of Guilford, by employing "the scores of some tests in which the keyed responses were weighted in proportion to the infrequency of occurrence in the population of examinees."[13] Unusualness of responses, in a statistical sense, was one of the major measurements of originality.

4. Elaboration. Torrance noted that elaboration required the specification of details that contributed to the general idea.[14] It was the ability to perform on tests when only the bare outline was given. The examinee was asked to list all minor steps needed to make the plan work.

Specific tasks that provided these four dimensions were specified in the Primary Data section of this study.

Culturally advantaged. Culturally advantaged referred to those children who were environmentally advantaged. These children resided in a high income neighborhood and, in addition, the occupation of the major wage earner in the family could be classified as professional, technical, or managerial. (Selection of population is discussed in detail in the Sample Population section of this research.)

Culturally deprived. Culturally deprived referred to those who were environmentally deprived. These children resided in a low income neighborhood and, in addition, the occupation of the major wage earner in the family was classified as craftsman, operative, private household worker, service worker, or laborer. (Selection of population is discussed in detail in the Sample Population section of this research.)

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[13] Guilford, op. cit., pp. 297-311.

[14] Torrance, op. cit., p. 310.

Hypotheses

The following were the hypotheses underlying the research:

Hypothesis 1. The multiple correlations between three independent variables (sex, intelligence, and socio-economic background) and the dependent variables (creativity test scores) would progressively decrease as the age and grade level of culturally advantaged children and culturally deprived children increased.

Hypothesis 2. The partial correlations between the intelligence quotients and the creativity test scores, when the influence of two other variables (sex and socio-economic background) were held constant, would progressively decrease as the age and grade level of culturally advantaged children and culturally deprived children increased.

Hypothesis 3. At three grade level (i.e., first, third, and fifth grade levels), there would be statistically significant differences between the performance of culturally advantaged children and culturally deprived children on tests of creativity when the sex and the intelligence were held constant.

Hypothesis 4. At three grade levels (i.e., first, third, and fifth grade levels), there would be statistically significant differences between the sexes in scores made on creativity tests when intelligence and socioeconomic background were held constant.

CHAPTER II

SURVEY OF THE RELATED LITERATURE

Hutchison[1] reviewed the publications on the process of creative thinking to the year 1931 and concluded that the subject had hardly been touched by anyone. Markey,[2] reviewing the subject of imagination, four years later, reported very little more in the way of a fundamental contribution to the subject.

Andrews[3] in 1930 noted that experimental work on imagination had been very slight and had been confined chiefly to the study of small numbers of adults and carried out under inadequately controlled conditions. For the most part ink blots had been the stimuli used. The use of the ink blot as a device for the investigation of imagination was first suggested by Binet and Henri in 1895.

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[1] E. D. Hutchison, "Materials for the Study of Creative Thinking," Psychological Bulletin, XXVIII (May, 1931), 392-410.

[2] F. V. Markey, "Imagination," Psychological Bulletin, XXXII (March, 1935), 212-36.

[3] E. G. Andrews, University of Iowa Studies; Studies in Character, The Development of Imagination in the Pre-School Child (Iowa City, Iowa: University of Iowa Press, 1930), p. 16.

H. L. Hargreaves[4] used a series of six tests in his study of imagination: (1) indeterminate picture completion, (2) unfinished pictures, (3) ink blots, (4) indeterminate language completion, (5) unfinished stories, and (6) writing words. The responses were scored on a fluency and frequency basis. Hargreaves used the term fluency to signify quantity of a number of items given in response to one stimulus. Frequency was used to indicate originality of response or quality and was measured by the number of responses which were peculiar to the individual subject and not used in that situation by any other subject. The results were treated statistically by the tetrad equation of Spearman.[5] Conclusions in brief are:

> Fluency of imagination equals "g;" on analysis of the factors no sign of a general unitary and unique imaginative power or faculty was found. It is tempting to regard the factor common to originality and fluency as factor X, but it need not necessarily be so.[6]

In these studies the varied methods of presenting the stimuli, the time given for responses, the methods of classification, and the wide distribution of subjects as to age and education make any comparison of results almost impossible.

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[4] H. L. Hargreaves, "The 'Faculty' of Imagination," British Journal of Psychology, Monograph Supplement, III (June, 1927), 1-27.

[5] C. Spearman, The Abilities of Man (London, England: Macmillan and Company, 1927).

[6] Hargreaves, op. cit., p. 25.

In 1930 Elizabeth Andrews[7] developed three tests of imagination (e.g. originality of reactions to visual stimuli), and administered them to a sample of preschool children. The experiment used children with an I.Q. range of 95 to 135, with no finer controls within the range. The study did not experiment with the same children or similar groups of children over an extended period of time. The conclusions, however, bear directly on this study.

> Correlations between IQ and Imagination, and M.A. and Imagination are so low and insignificant as to indicate that very little relationship exists between intelligence and the fantastic imagination of the young child. A somewhat significant minus correlation exists between chronological age and imagination (-.31 ≠ .06). Sex differences are slight, but insofar as they exist are in favor of the girls. The average score for girls was 63.25 for boys an 60.5, a difference of .76. Girls reach the height of imagination one year earlier than boys, excelling them at three years of age, while the boys excel at four years. The difference at three years is 8.91 in favor of the girls with a P.E. of the difference of .43. At four years the difference is 5.45 in favor of the boys with a P.E. of the difference of .05.[8]

Further conclusions of the study were that boys reach their high point one year later than the girls and the scores fall more rapidly so that at the six year level the girls are again slightly higher than the boys.

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[7] Andrews, *op. cit.*, p. 15.

[8] *Ibid.*

Despite this the intelligence test remained essentially the same, emphasizing learning ability and school achievement, and neglecting creative ability.

Only in the last decade has the creative child been distinguished from the intellectually gifted. An interesting historical background on the intellectually gifted child appears in the book The Gifted Child Grows Up, by Terman and Oden.[9]

> In western Europe and in America a definite change took place eighty or a hundred years ago in the attitude of people toward what we now call the gifted child. Prior to that time the youthful prodigy was generally regarded with a mixture of admiration, awe, and hopeful expectation. His parents were envied, and the child was likely to be made the protege of a prince or king. Then, after 1850, or thereabouts, one finds an increasing number of treatises, written chiefly by doctors and educational theorists, in which the "Precocious" child was classed with the abnormals, depicted as a neurotic, and alleged, if he survived at all, to be headed for post-adolescent stupidity or insanity. Gradually the view came to prevail that a rich and well-balanced maturity demands the prolongation of infancy and the fullest living-out of each developmental stage. Not only should the bright child be protected from intellectual stimulation; any tendency toward cleverness should be postively discouraged. "Early ripe, early rot" was the slogan of those who favored slow maturation. The myth became prevalent that many of the great geniuses were dunces in childhood.
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> When, in 1904, Terman surveyed the literature on mental precocity that had appeared in the preceding decades in America, England, Germany, and France, he found the sentiment against the intellectual prodigy

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[9] Lewis M. Terman and Melita H. Oden, The Gifted Child Grows Up (Stanford, California: Stanford University Press, 1947), p. 1.

> so nearly unanimous that he was inclined to assume it must be well grounded. The following year, as it happened, his faith in the current theory was considerably weakened by the results of an experimental study of two contrasting groups of bright and dull children, but it was not until some time later, when the task of revising the Binet scale led him to test and follow up many bright subjects, that his skepticism was complete. It had become evident that here was a problem of major social and educational importance.

In 1921 by a generous grant to Stanford, from which later grants were to follow, Terman had an opportunity for a large-scale attack on the problem of the physical, mental, and personality traits that are characteristic of intellectually superior children and the sort of adults the typical gifted children become. By that time Terman was already following the development of about a hundred children who had tested above 130 I.Q. on the Stanford-Binet scale. It was proposed to sift a school population of a quarter-million in order to identify and study a thousand or more of highest I.Q.

A recent plea from researchers in the field of the gifted (Guilford,[10] Getzels and Jackson,[11] and

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[10] J. P. Guilford, "Creativity," *American Psychologist*, V (September, 1950), 444; J. P. Guilford, "Basic Traits in Intellectual Performance," in C. W. Taylor (ed.), *The Second 1957 Research Conference on the Identification of Creative Scientific Talent* (Salt Lake City, Utah: University of Utah Press, 1958), pp. 66-81; and J. P. Guilford, "The Relation of Intellectual Factors to Creative Thinking in Science," in C. W. Taylor (ed.), *The 1955 University of Utah Research Conference on the Identification of Creative Scientific Talent* (Salt Lake City, Utah: University of Utah Press, 1956), pp. 69-95.

[11] J. W. Getzels, and P. W. Jackson, *Creativity and Intelligence* (New York: John Wiley and Sons, 1962).

Torrance[12]), has been raised for a redefinition of the gifted, based on the belief that only a portion--and perhaps a small one at that--of human cognition is included in the criteria we use for defining the gifted person. To indicate an I.Q. of 130 or the top two or three percent of the school population is not sufficient definition of such a highly significant group of individuals. This recent upsurge of interest in creativity has been occasioned by postsputnik pressures upon educators and psychologists and it has been aimed at identifying and devising appropriate education for the gifted child.

In 1950, in his presidential address to the American Psychological Association, Guilford instigated the present scholarly enthusiasm for the systematic study of creativeness.[13] He pointed out that the neglect of the subject of creativity by psychologists was appalling. An important reason for the neglect, mentioned by Guilford is the difficulty of problems themselves.

> A practical criterion of creativity is difficult to establish because creative acts of an unquestioned order of excellence are extremely rare. In this respect, the situation is much like that of a criterion for accident proneness which calls for the actual occurrence of accidents. The accidental

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[12] E. P. Torrance, Guiding Creative Talent (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962).

[13] Guilford,"Creativity," *op. cit.*, pp. 444-65.

> nature of many discoveries and inventions is well recognized. This is partly due to the inequity of stimulus or opportunity, which is largely a function of the environment rather than of individuals. But if environmental occasions were equal, there would still be great differences in creative productivity among individuals.[14]

Guilford believed that a creative act is an instance of learning, "for it represents a change in behavior that is due to stimulation and/or response. A comprehensive learning theory must take into account both insight and creative activity."[15]

Guilford stated that it is probably only a layman's idea that the creative person is peculiarly gifted with a certain quality that ordinary people do not have.

> The general psychological conviction seems to be that all individuals possess to some degree all abilities, except for the occurrence of pathologies. Creative acts can therefore be expected, no matter how feeble or how infrequent, of almost all individuals. The important consideration here is the concept of continuity. Whatever the nature of creative talent may be, those persons who are recognized as creative merely have more of what all of us have. It is this principle of continuity that makes possible the investigation of creativity in people who are not necessarily distinguished.[16]

Guilford further noted that the reason that different intelligence test do not intercorrelate perfectly, even when errors of measurements have been taken into account, is that each test emphasizes a different pattern of primary abilities.

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[14] _Ibid._, p. 448. [15] _Ibid._, p. 449.

[16] _Ibid._, p. 446.

> If the correlations between intelligence test scores and many types of creative performance are only moderate or low, and I predict that such correlations will be found, it is because the primary abilities represented in those tests are not all important for creative behavior. It is also because some of the primary abilities important for creative behavior are not represented in the test at all. It is probably safe to say that the typical intelligence test measures to a significant degree not more than a half-dozen of the intellectual factors. . . . Some of the abilities contributing to creative success are probably non-intellectual; for example, some of them are perceptual. Probably, some of the factors most crucial to creative performance have not yet been discovered in any type of test. In other words, we must look well beyond the boundaries of the IQ if we are to fathom the domain of creativity.[17]

Guilford has since developed tests of "convergent" thinking and "divergent" thinking which seem to measure distinctly different aspects of cognition. In 1959, Guilford summarized his thinking and research findings in the area of creativity.[18] He suggested that the lack of psychological knowledge in this area might be attributed to the inappropriateness of the stimulus-response and Hullian models for the study of the high thought processes, and recommended an approach through trait concepts, defined by means of factor analysis. Guilford postulates that there is very likely a fluency factor, or there are a number of fluency factors, in creative talent.

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[17] *Ibid.*, p. 449.

[18] J. P. Guilford, "Traits of Creativity," in H. H. Anderson (ed.), *Creativity and Its Cultivation* (New York: Harper and Brothers, 1959), pp. 142-61. (This work is a series of papers presented at the inter-disciplinary symposis on creativity, Michigan State University, East Lansing, Michigan.)

> It is rather that the person who is capable of producing a large number of ideas per unit of time, other things being equal, has a greater chance of having significant ideas. . . .[19]

Guilford believed that the creative person has novel ideas. The degree of novelty of which the person is capable, or which he habitually exhibits, is pertinent to this study. This can be tested in terms of the frequency of uncommon yet acceptable responses to items. The tendency to give remote verbal associations in a word-association test; to give remote similarities in a similes tests; and to give connotative synonyms for words, are examples of indications of novelty of ideas in the category of verbal tests.

> The individual's flexibility of mind, the ease with which he changes set, can possible be indicated in several ways by means of tests . . .
>
> Much creative thinking requires the organizing of ideas into larger, more inclusive patterns. For this reason, we have hypothesized a synthesizing ability. As a counterpart to this, one might well expect an analyzing ability . . .
>
> From Gestalt psychology comes the idea that there may be a factor involving reorganization of redefinition or organized wholes.
>
> Many inventions have been in the nature of a transformation of an existing object into one of different design, function, or use. It may be that this activity involves a combination of flexibility, analysis and synthesis, and that no additional hypothesis of redefinition is really needed, but the possibility must be investigated . . .
>
> There is a possibility of a dimension of ability that has to do with the degree of complexity or of intricacy of a conceptual structure of which the individual is capable. How many inter-related ideas can the person manipulate at the same time? The scientist must often keep in mind several variables, conditions, or relationships as he thinks out a problem . . .

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[19] *Ibid*., p. 447.

> Creative work that is to be realistic or accepted must be done under some degree of evaluative restraint. Too much restraint, of course, is fatal to the birth of new ideas. The selection of surviving ideas, however, requires some evaluation. In this direction there must be a factor or two . . .[20]

Guilford said that the question will inevitably arise, "How do you know your tests are valid?" This question has already been directed to this study several times. Guilford gives two answers to this question. The first is that the factorial study of the tests is in itself one kind of validation. It will determine which tests measure each factor and to what extent. That is a matter of internal validity or factorial validity. It answers the question, "What does the test measure?" The second answer will be in terms of which factors are related to the creative productivity of people in everyday life. That calls for the correlation of factor measures with practical criteria.

Since Guilford's insightful statements were made, there has been research evidence to support his hypotheses. Getzels and Jackson, in their classic study, stated:

> The items on the typical intelligence test, seemed to us to represent a rather narrow band of intellectual tasks . . . to do well on the typical intelligence test, the subject must be able to recall and to recognize perhaps even to solve; he need not necessarily to be able to invent or innovate.[21]

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[20] Guilford, "Traits of Creativity," p. 449.

[21] Getzels and Jackson, op. cit., p. 4.

Morris Stein and Shirley Heinz,[22] in their compilation of research through 1959, stated:

> The literature concerning creativity has dealt with three major areas--the individual, his characteristics, and the processes through which he arrives at the creative product; the environment, its facilitating or inhibiting effect on creativity; and the relationship of creativity to the transactions between the individual and his environment.

The book by Stein and Heinz summarized a representative selection of the works of psychologists and psychiatrists on the first of the areas mentioned, eliminating those investigations dealing with a specific issue. The authors point out that the most striking features of the literature on creativity is the variety of approaches that investigators have followed, the variety of results that have been obtained, and the numerous factors about which suggestions and speculations have been made. As examples, there are those who had designed experiments or used psychological tests, or conducted interviews, or some combination of these approaches, while others speculated about creativity on the basis of biographies they read or experiences they have had. On the subject of the criterion of who is a creative person, there were those who had selected their subjects on the basis of scores on intelligence tests; others used number of citations or number of lines devoted to a person in histories or biographies of famous people. Another group of investigators have utilized the judgments of professionally qualified people; while there are those investigators who have concerned themselves with people of generally acknowledgedcreativity.

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[22] M. I. Stein and S. Heinz, Creativity and the Individual; Summaries of Selected Literature in Psychology and Psychiatry (Chicago, Illinois: Free Press of Glencoe, Illinois, 1960), p. 1.

Wide Interest in Creativity Today

Creativity is now a subject of wide interdisciplinary interest. A number of symposia have been given recently to define and refine the concepts of creativity from a variety of approaches, to suggest criteria for recognizing the process of creativity as seen in the biological, social, and natural sciences.[23] Addresses presented at an interdisciplinary symposium[24] on creativity at Michigan State University, East Lansing, Michigan, posed the following questions: What are the characteristics of a creative person? Is creativity a process or a product, and what differences does it make how one regards it? What is the role of intuition, insight, inspiration, and just plain hard work in creativity? How do authors regard the relation of the unconscious to the conscious in creativity? What is the relation of intelligence and talent to creativity? Is creativity properly reserved for the genius, the person of "high level talent" in the arts or sciences? What is the range of activities included under creativity? For Edmund W. Sinnott, creativity is life itself.[25] For Alden Dow, it is a way of life.[26] For Harold Anderson, it is optimum growth in social interaction.[27] For E. Maslow, it is a maximum of self-actualizing.[28] It is possible to extend the range and fill in details with examples from the other authors. If creativity is a broad way of life then the characteristics of the creative person would be those characteristics which describe a person in the full vigorous adventure of living--affection for an idea, absorption, concentration, intensity of encounter, peak experience, delight, ecstasy. Such words are used by authors cited in describing the creative experience. These authors have departed from a long tradition in psychology and philosophy. They have questioned the separated meaning of cognition and learning on one hand and the priority which these have been given over emotion, personality, and motivation on the other. Hilgard[29] spoke of the totality of problem-solving. He said that the problem solver is one and indivisible and it is only the experimenter who chooses to abstract one or the other facet of the totality of study. He found personality variables were important, even in the solution of simple laboratory type problems that seemed almost purely "cognitive." In retrospect, he reported that the personality studies opened up more useful leads than the learning studies. Stoddard[30] pointed out that most of the school instruction is oriented about so-called cognitive learning, and deplored the lack of opportunity for affect or personal involvement in the child's school experience.

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[23] C. W. Taylor (ed.), *The 1955 University of Utah Research Conference on the Identification of Creative Scientific Talent* (Salt Lake City, Utah: University of Utah Press, 1956), pp. 69-95; C. W. Taylor (ed.), *The Second 1957 Research Conference on the Identification of Creative Scientific Talent* (Salt Lake City, Utah: University of Utah Press, 1958), pp. 66-81; C. W. Taylor and F. Barron (eds.), *Scientific Creativity, Its Recognition and Development: Selected Papers from the Proceedings of the First, Second, and Third University of Utah Conferences* (New York: John Wiley and Sons, Inc., 1963), p. 419; and C. W. Taylor, *Creativity: Progress and Potential* (New York: McGraw-Hill Book Company, Inc., 1964), pp. 49-128; and C. W. Taylor (ed.), *Utah Creativity Research Conference* (Salt Lake City, Utah: University of Utah Press, 1967).

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[24] H. H. Anderson, Creativity and Its Cultivation (New York: Harper and Row, Publishers, 1959).

[25] Edward W. Sinnott, "The Creativeness of Life," ibid., p. 24.

[26] Alden Dow, "An Architect's View on Creativity," ibid., p. 30.

[27] Anderson, op. cit., p. 119.

[28] E. Maslow, "Creativity in Self-Actualizing People," ibid., p. 24.

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[29] E. R. Hilgard, "Creativity and Problem Solving," ibid., p. 162.

[30] G. D. Stoddard, "Creativity in Education," ibid., p. 191.

The three conferences conducted by the University of Minnesota followed the same pattern. These latter studies were concerned to discover how the gifted child should be taught, how he learns, how he should be grouped for the best results, how he should be administered, and how he should be evaluated.[31]

Though the concept of creativity has been picked up by business and industry as a device for improving management and for increasing profits, the emphasis remains on the specially gifted person. For example, Harvard Business Review featured an article on the operational approach to creativity, and asked whether it might be spelled out so that management could take maximum advantage of it. The three conferences held at Arden House, Harriman, New York in 1956 and 1957 were sponsored by thirteen industrial corporations and focused upon ways that creative ideas could be channeled into business and industry. The Carnegie Corporation has been supporting a six-year study of creativity at the University of California in Berkeley. This research to date has been limited to highly gifted people--to novelists, essayists, poets, architects, research scientists, and mathematicians.

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[31] E. Paul Torrance, et al., The Minnesota Studies of Creative Thinking in the Early School Years: Research Memo (Minneapolis, Minnesota: Bureau of Educational Research, 1960), pp. 60-1.

Researchers currently are going so far as to differentiate originality and creativity.[32] Originality, or original thinking, is referred to as:

> Behavior which occurs relatively infrequently, is uncommon under given conditions, and is relevant to those conditions. Criteria of relevance and uncommonness, of course, must be established for any given situation. This is a problem more readily solvable within the laboratory than without. Creativity, according to the present usage, refers to products of such behavior and the reactions of other members of a society to those products. An invention is a creative product that may have an important effect upon society and is a consequence of original behavior. But considerably more variables enter into the determination of creative works than originality alone.[33]

Maltzman's distinction implies that an individual may be highly original but not creative. His brilliant theories are never published, or they are not implemented by the necessary research. The original research may be conducted, but the results are not published or patented.

> All this may be done, but the work may be overlooked or the implications disregarded by the appropriate community of scholars or society at large. Further common illustrations may be given, indicating that a great many more behavioral and

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[32] Irving Maltzman, "On the Training of Originality," Psychological Review, LXVII (July, 1960), 229-42.

[33] Ibid.

> societal variables influence creativity than originality, making the study of originality under simplified laboratory conditions more feasible than that of creativity.[34]

The issue of creativity versus originality was not a major part of this study.

The Minnesota Studies of Creative Behavior

Major outcomes and the current stage of development of the studies done by Torrance at the University of Minnesota from 1958 to 1966 have been represented by approximately two hundred articles, books, or chapters in books, including a number of summaries and reviews.[35]

At the present writing hundreds of studies have made use of the Torrance instruments and materials developed through the Minnesota Studies of Creative Behavior but it has not been possible for Torrance to obtain copies of all of them. Torrance, however, summarized three hundred studies in the new Journal of Creative Behavior.[36] Torrance reported in this Journal that what was labeled the Minnesota Studies of Creative Behavior became the Georgia Studies of Creative Behavior in September, 1966.

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[34] *Ibid.*, p. 229.

[35] Torrance, *Guiding Creative Talent*; E. P. Torrance, *Education and the Creative Potential* (Minneapolis, Minnesota: University of Minnesota Press, 1963); E. P. Torrance, "Explorations in Creative Thinking in the Early School Years: A Progress Report," in C. W. Taylor and F. Barron (eds.), *Scientific Creativity: Its Recognition and Development* (New York: John Wiley and Sons, 1963), pp. 173-83; E. P. Torrance, "Education and Creativity," in C. W. Taylor (ed.), *Creativity: Progress and Potential* (New York: McGraw-Hill Book Company, 1964), pp. 49-128.

In March, 1966, a new technical-norms manual[37] of the Torrance Tests of Creative Thinking was published summarizing in considerable detail the studies that relate to the validity of the tests of creative thinking ability. The writer has cited these studies in the section on Validity in this study.

From the above summaries, the author has selected specific studies which seem to be directly related to this research.

Torrance consistently obtained small correlations between measures of intelligence and creativity. The relationships have rather consistently been higher for girls than for boys, for the lower half or lower quarter of the intelligence continuum than for the upper half or quarter, for verbal than for figural measures, and for fluency and elaboration than for originality. Torrance noted that most of the studies that have been reported have failed to consider these and other dynamics of the relationship involved. A good summary of these correlations is represented from a Table appearing in Torrance's article.[38]

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[36] E. Paul Torrance, "The Minnesota Studies of Creative Behavior: National and International Extensions," The Journal of Creative Behavior, I (Spring, 1967), 2, 137-54.

[37] E. Paul Torrance, Torrance Tests of Creative Thinking: Norms-Technical Manual, Research Edition, Verbal Tests, Forms A and B, Figural Tests, Forms A and B (Princeton, New Jersey: Personnel Press, Inc., 1966).

In this table a tabulation of the reported product-moment coefficients of correlation between measures of intelligence and the various versions of the _Torrance Tests of Creative Thinking_ are reported from all available studies. From a total of 178 coefficients of correlation between measures of intelligence, and a total or composite measure of creative thinking ability, the median is .20. The median of 88 coefficients between intelligence and verbal creativity is .21, and the median of the 114 coefficients of correlations between intelligence and figural creativity is .06. These correlations point out the futility of doing simple correlational studies between measures of intelligence and creativity.

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[38] _Ibid._, p. 148.

CHAPTER III

THE DATA, RESEARCH METHODOLOGY, AND STATISTICAL TREATMENT OF THE DATA

The Sources of the Data

The data of this study were composed of two types: (a) primary data, and (b) secondary data. A brief discussion of each of the types of data follows.

Primary data:

a. Scores were obtained by administering the *Torrance Tests of Creative Thinking*, *Verbal and Figural*, *Forms A* to children in six elementary schools in the District of Columbia. Each of the three non-verbal tasks on *Figural Form A* (Picture Construction, Incomplete Figures[1] and Parallel Lines) required ten minutes for administration. These tasks were designed to elicit greater variability in fluency, flexibility, originality, and elaboration.

Verbal Form A consisted of six tasks, requiring a total of approximately forty-five minutes for administration.

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[1] F. Barron, "The Psychology of Imagination," *Scientific American*, CXCIX (September, 1958), 199, 151-66. *Test* is an adaptation of Kate Franck's *Drawing-Completion Test* described by Frank Barron.

Each task was designed to bring into play somewhat different mental processes, yet each required the subject to think in divergent directions, in terms of possibilities.

The Ask-and-Guess Tasks were included in the battery to give subjects an opportunity to express their curiosity and to give a picture of their ability to develop hypotheses and to think in terms of possibles. It seemed to Torrance that much of the essence of creative thinking, especially creative scientific thinking, was captured in the process of asking and guessing. The Asking Task was aimed at getting at the subject's ability to become sensitive to the unknown, to gaps in knowledge, because the questions asked must be questions which cannot be answered by looking at the picture.

The Product Improvement Task required the child, within a time limit of ten minutes, to think of as many different improvements as possible for a small stuffed toy elephant, similar to the one in the Manual. (See Appendix A).

The subject was asked in the Unusual-Uses-of-Cardboard-Boxes Task to think of as many uses as he could for cardboard boxes.

In Guess Consequences, the subject was asked to name as many possibilities of what might happen as a result of what was taking place in the picture. (See Appendix A.)

In this test, the subject was given an improbable situation such as "Just suppose clouds had strings attached to them, which hung down to the earth."

Tables I and II give further breakdowns of the tests used in terms of the four categories in each test. For example, the Ask-and-Guess Task was scored on the basis of four dimensions: Ideational Fluency, Spontaneous Flexibility, Originality, and Elaboration.

Table III gives a representation of all tests used in the research.

b. Scores were obtained from Lloyd M. Dunn's Peabody Picture Vocabulary Test (PPVT),[2] to provide an intelligence quotient.

Secondary data:

a. Published articles in professional journals and books containing information concerned with the identification and encouragement of creative thinking abilities of children.

b. Master's theses and doctoral dissertations concerned with the creativity of children.

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[2] Lloyd M. Dunn, Peabody Picture Vocabulary Test (Minneapolis, Minnesota: American Guidance Service, Inc., 1959).

TABLE I

DIMENSIONS OF CREATIVITY ON EACH SUBTEST OF THE VERBAL BATTERY

Ask-and-Guess	Product Improvement	Unusual Ideas	Unusual Questions	Consequences	Total Score	Standard Score
Ideational Fluency Spontaneous Flexibility Originality Elaboration Total Score	Ideational Fluency Spontaneous Flexibility Originality Elaboration Total Score	Ideational Fluency Spontaneous Flexibility Originality Elaboration Total Score	Ideational Fluency Spontaneous Flexibility Originality Elaboration Total Score	Ideational Fluency Spontaneous Flexibility Originality Elaboration		

TABLE II

DIMENSIONS OF CREATIVITY ON EACH SUBTEST OF THE NON-VERBAL BATTERY

Figure Construction	Figure Completion	Lines	Total Score	Standard Score
Ideational Fluency	Ideational Fluency	Ideational Fluency		
Spontaneous Flexibility	Spontaneous Flexibility	Spontaneous Flexibility		
Originality	Originality	Originality		
Elaboration	Elaboration	Elaboration		
Total Score	Total Score	Total Score		

TABLE III

TESTS AND SUBTESTS USED IN THE STUDY

Intelligence Test	Torrance Tests of Creative Thinking								
	Verbal Tests					Non-Verbal Tests			
Peabody Picture Vocabulary Test	Product Improvement	Unusual Ideas	Unusual Questions	Consequences	Total Score	Picture Construction	Figure Completion	Lines	Total Score

Criteria for the Admissibility of Test Scores

Standardization procedures and norms, reliability, and validity for each of the criterion measures stated above were described separately in the manuals of each test cited under Primary Data section of this paper.

The Research Methodology

General statement of methodology.

The research design was in accordance with the demands of the experimental method. This research was concerned primarily with regression analysis of three independent variables (sex, intelligence, and socio-economic background) in relation to sixteen dependent variables (dimensions of creativity) for three different grade levels; i.e., first, third, and fifth grade levels.

Sample Population

In order to obtain representative samples of students from two socio-economic levels, the author abstracted and summarized social and economic data as seen in Tables IV and V[3] from a report[4] on the subject with respect to the

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[3] Full tables are in Appendix D of this research.

[4] Department of Public Health, District of Columbia, Social and Economic Characteristics, District of Columbia, Statistical Areas: April 1, 1960 (Washington: Population Analysis Unit, Biostatistics Division, District of Columbia, Department of Public Health, 1960).

TABLE IV

OCCUPATIONAL CHARACTERISTICS OF AREAS II, III, AND IX, FROM WHICH PARTICIPATING SCHOOLS WERE SELECTED
APRIL 1, 1960*

U.S. Census Tract Areas	Total Employed	Males Employed	Females Employed	Professional, Technical, and Managerial	%	Clerical and Sales	%	Craftsmen Operatives Private Household Workers, Service Workers, and Laborers	%	Not Reported	%
Total Employed in D.C.	341,563	185,577	155,986	69,671	20.4	101,359	29.7	134,641	39.4	35,892.	10.5
II	26,902	14,399	12,503	12,718	47.3	9,405	34.9	3,158	17.8	1,621	6.0
III	26,178	14,127	12,051	5,853	22.3	9,252	35.4	8,627	33.0	2,447	9.3
IX	12,239	7,225	5,014	1,744	14.2	3,394	27.7	5,152	42.2	1,949	15.9

*Note: Data abstracted and summarized from Table 55 in Social and Economic Characteristics, District of Columbia, Statistical Areas, pp. 136-38. (Full tables in Appendix of this study.)

TABLE V

ECONOMIC CHARACTERISTICS OF AREAS II, III, AND IX, FROM WHICH PARTICIPATING SCHOOLS WERE SELECTED--PERCENT DISTRIBUTION OF FAMILY INCOME-1960*

U.S. Census Tract Areas	Under $3,000	$3,000 to $5,999	$ 6,000 to $10,000	Over $10,000
II	5.9	10.5	22.9	60.0
III	9.9	28.2	35.8	26.1
IX	29.6	35.3	19.9	15.2

*Full tables in Appendix.

seventeen United States Census Tract Areas in the District of Columbia.[5] (Map of these areas is in Appendix C of this research.) With the benefit of this knowledge of these characteristics of the areas, six elementary schools were selected, i.e., three schools which enrolled children from Area II (having characteristics that were in large part culturally advantaged) and three schools which enrolled children from Areas III and IX (having characteristics that were in large part culturally deprived). As an assurance that the children used in this sample population satisfied the requirements of having backgrounds that were culturally advantaged and culturally deprived, respectively, data were obtained from school authorities showing the occupations of the major wage earner in the family of each student participating in the study. (A sample listing of these occupations is appended to this research, Appendix E.)

Using this information, culturally advantaged children were selected from the three schools in Area II who met the criterion of having the major wage earner in the family engaged in those occupations which were categorized as professional, technical, or managerial. Culturally deprived children were selected from the three schools in Areas III and IX who met the criteria of having the major wage earner in the family engaged in those occupations which were categorized as craftsmen, operatives, private household workers, or laborers.[6] (Moser and Hall used occupation successfully as a criterion for socio-economic status.[7])

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[5] The report summarized available social and economic data from the 1960 Census of Population for the city as a whole and for the seventeen statistical areas into which the city had been divided. It was the only publication on this subject the Department of Public Health expected to issue in the decade between 1960-1970 Censuses. The source of all the information in this report was the compilation of census tract data for the Washington Standard Metropolitan Statistical Areas made by the United States Bureau of the Census and published as one in its series of final reports on the United States Censuses of Population and Housing.

The sample population tested on Figural Test A, Torrance Tests of Creative Thinking, during the school year, September through May, 1966-67, totaled 721 first, third, and fifth grade elementary school children, i.e., 242 first grade elementary school children, 264 third grade elementary school children, and 215 fifth grade elementary school children. Five hundred children in the above sample were also tested on Verbal Test A, Torrance Tests of Creative Thinking, i.e., 167 first grade elementary school children, 166 third grade elementary school children, and 167 fifth grade elementary school children. The testing program was conducted according to Tables VI and VII.

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[6] Descriptions of these occupations as set forth in the U. S. Census report are listed in Appendix F of this study.

[7] C. A. Moser and J. R. Hall, "The Social Grading of Occupations," Social Mobility in Britain, David Glass, ed. (London: Routledge and Kegan Paul, Limited, 1966), pp. 29-50. In their study, occupation was used as a criterion for constructing a classification of social status, called The Standard Classification: "Though clearly not the only important criterion which might have been selected, it [occupation] is a particularly useful one because it is linked to economic status and to educational background. It is therefore correlated with the 'pattern of living' of an individual. Moreover, it is one of the aspects of social status which springs most readily to mind when people try to assess the position of an individual in the social hierarchy."

Statistical Treatment of the Data

For all subproblems, the creativity tests were scored, and the raw scores were converted to standard scores, as in Tables VIII and IX.[8] (A sample data sheet is appended to this study, Appendix B.) These group norms were supplied by Torrance for comparative purposes.

The use of T-scores made it easier to determine an individual's strongest and weakest performances. They were particularly useful in comparing results on groups tested in this study with groups tested by Torrance.[9]

For the solution of subproblems 1, 3, and 4 (pages 1 and 2 state each subproblem), multiple regression coefficients were computed. For subproblem 1, the corresponding

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[8] E. Paul Torrance, Torrance Tests of Creative Thinking: Norms Technical Manual, Research Edition (Princeton, New Jersey: Personnel Press, Inc., 1966), p. 67.

[9] Ibid., pp. 60, 62-69.

TABLE VI

DESIGN OF TESTING FOR REPRESENTATIVE SAMPLE ON FIGURAL TEST OF CREATIVE THINKING

	Culturally Advantaged						Culturally Deprived					
	First Grade		Third Grade		Fifth Grade		First Grade		Third Grade		Fifth Grade	
Male	N=59		N=65		N=54		N=63		N=60		N=53	
Female		N=57		N=69		N=53		N=63		N=70		N=55
Totals	N=116		N=134		N=107		N=126		N=130		N=108	

TABLE VII

DESIGN OF TESTING FOR REPRESENTATIVE SAMPLE ON VERBAL TEST OF CREATIVE THINKING

	Culturally Advantaged						Culturally Deprived					
	First Grade		Third Grade		Fifth Grade		First Grade		Third Grade		Fifth Grade	
Male	N=59		N=65		N=54		N=63		N=60		N=53	
Female		N=57		N=69		N=53		N=63		N=70		N=55
Totals	N=116		N=134		N=107		N=126		N=130		N=108	

TABLE VIII

T-SCORE CONVERSION TABLE FOR FLUENCY, FLEXIBILITY, AND ORIGINALITY OF VERBAL FORM A OF THE TORRANCE TESTS OF CREATIVE THINKING BASED ON FIFTH GRADE DATA

T-Score*	Raw Scores		
	Fluency	Flexibility	Originality
100	218	69	148
95	204	65	136
90	189	61	125
85	175	56	114
80	161	52	103
75	147	48	92
70	133	44	81
65	119	40	70
60	105	35	59
55	90	31	47
50	77	27	37
45	63	24	25
40	48	20	14
35	34	15	3
30	20	11	--
25	6	7	--
20	--	3	--

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*T-Score refers to standard scores, with a mean of 50 and a standard deviation of 10 points.

TABLE IX

T-SCORE CONVERSION TABLE FOR FLUENCY, FLEXIBILITY, ORIGINALITY, AND ELABORATION FOR FIGURAL FORM A OF THE *TORRANCE TESTS OF CREATIVE THINKING* BASED ON FIFTH GRADE DATA

T-Score	Raw Scores			
	Fluency	Flexibility	Originality	Elaboration
100	--	--	68	167
95	--	--	64	157
90	--	38	59	146
85	--	35	55	135
80	--	33	51	124
75	41	30	47	113
70	38	27	42	102
65	34	24	38	92
60	31	22	34	81
55	27	19	29	70
50	24	16	25	59
45	20	14	22	49
40	17	11	17	38
35	13	8	13	27
30	10	6	9	16
25	6	3	5	6
20	3	0	0	--

multiple correlations were also calculated. Subproblem 2 called for the statistical method of partial correlation only. The three statistical methods used were as described in detail below.

Multiple Linear Regression

The multiple linear regression was computed, with sex (Y_1), intelligence (Y_2), and socio-economic background (Y_3) as the three common independent variables and the dimensions of creativity (Y_c) as the sixteen dependent variables. This technique called for the solution of the constants a, b_1, and b_3 in the equation of the straight line:[10]

$$Y_c = a + b_1x_1 + b_2x_2 + b_3x_3$$

where x_1 = 1 (male); 0 (female)

x_2 = intelligence quotient

x_3 = 1 (culturally advantaged);

0 (culturally deprived)

a = a constant

Each of the sixteen dimensions of creative thinking substituted Y_c in the formula by the following symbols:

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[10] H. E. Garrett, Statistics in Psychology and Education (New York: Longmans, Green and Company, 1956), p. 391.

Y_{c1} = Fluency Raw Scores (Figural or Verbal)
Y_{c2} = Fluency Standard Scores (Figural or Verbal)
Y_{c3} = Flexibility Raw Scores (Figural or Verbal)
Y_{c4} = Flexibility Standard Scores (Figural or Verbal)
Y_{c5} = Originality Raw Scores (Figural or Verbal)
Y_{c6} = Originality Standard Scores (Figural or Verbal)
Y_{c7} = Elaboration Raw Scores (Figural only)
Y_{c8} = Elaboration Standard Scores (Figural only)
Y_{c9} = Creative Thinking (Composite Standard Scores, Figural or Verbal)

It was possible to list the b coefficients or partial regression coefficients in tables, listed in Chapter IV. Scatter diagrams (Appendix H) for each grade level for each criterion dimension of creativity, i.e., fluency, flexibility, originality, and elaboration were also made. These partial regression coefficients gave the weights to be attached to the scores of each independent variable when the criterion creativity was predicted from the three independent variables in combination. In other words, the regression coefficients gave the weights which each variable exerted in determining creativity when the influence of the other variables was excluded. Hence, it was shown from the regression equation just what role each of the several test variables played in determining the score on each of the dimensions of creative thinking.

The standard errors of regression coefficients were computed and then the significance of each of the *b* coefficients was determined. The formula for the standard deviation of the coefficient (standard error) was:[11]

$$V\ (b_1) = \frac{\sigma_1^2}{n\ \sigma^2_{1\ .\ 23}}$$

$$V\ (b_2) = \frac{\sigma_1^2}{n\ \sigma^2_{2.13}}$$

$$V\ (b_3) = \frac{\sigma_1^2}{n\ \sigma^2_{3.12}}$$

Where: V = variance

b_1= the regression coefficient for sex.

b_2= the regression coefficient for intelligence.

b_3= the regression coefficient for socio-economic background.

n = number of subjects

If $\left| \frac{b_1}{\sqrt{V\ (b_1)}} \right| > 2.58$, there is significance at the .01 level. $\underline{b_2}$ and $\underline{b_3}$ were substituted in this formula.

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[11] Harold Cramer, Mathematical Methods of Statistics (New Jersey: Princeton University Press, 1946), p. 552.

Multiple Correlation

The coefficient of multiple correlation, R, was then computed for each set of regressions to indicate the joint predictive power of the regressions by the formula:[12]

$$R_Y\ (1.2.3) = \frac{1 - \sigma^2_{Y.123}}{\sigma_Y^2}$$

Where: R_Y (1.2.3) = the coefficient of multiple correlation.

σ_Y = the standard deviation of the criterion (creative thinking) scores.

σ_Y (1.2.3) = the variability left in one independent variable when the variability of 1,2,3 was held constant through multiple regression.

The test of significance of the multiple correlation was made by referring to Table J titled "for four variables."[13]

Partial Correlation

The statistical method of partial correlation was used to find the net relationship between two variables, intelligence (2) and creativity (Y), when the influence of two other variables, sex (1) and socio-economic background (3), were eliminated, using the formula:[14]

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[12] Garrett, op. cit., p. 395.

[13] Ibid., pp. 429-32.

$$r_{Y2.13} = \frac{r_{Y2.3} - r_{Y1.3} \cdot r_{21.3}r_{Y}}{\sqrt{1 - r^{2}_{Y1.3}} \; \sqrt{1 - r^{2}_{21.3}}}$$

Where r = partial correlation coefficient.

$Y_{2.13}$ = the primary subscript to the left of the point (2) defines the variable, intelligence. The secondary subscripts to the right of the point (1 and 3) denote the variables sex and socio-economic background) held constant.

Partial correlations were listed in table form for all criterion measures of creativity for each of the three grade levels, i.e., first, third, and fifth grade levels.

The significance of the partial correlations was tested against the null hypothesis, by using the column headed "2 variables," in Table J.[15] The degrees of freedom for the partial correlation were (N-m) where N equaled the number of cases and m equaled the number of variables entering into the partial correlation, in this case four variables. The .05 significance levels were reported.

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[14] Ibid., p. 388.

[15] Ibid., pp. 437-39.

CHAPTER IV

RESEARCH RESULTS AND INTERPRETATIONS

Results Related to Subproblems

Solution to subproblem 1 was obtained from results on multiple correlation coefficients set forth in Tables X and XI, and multiple linear regression analysis set forth in Tables XII and XIII. Data for these tables were treated in the manner described in Chapter III, pages 47-50.

A. Multiple correlation coefficients: figural creative thinking (Table X). On the first grade level the correlations between eight dimensions, out of a possible nine dimensions of creativity and the combined independent variables of sex, intelligence, and socio-economic status, were significant at the .01 level. These correlation coefficients were on the criterion dimensions of figural fluency expressed as raw scores and as standard scores (columns Y_{c1} and Y_{c2}), figural flexibility expressed as raw scores and as standard scores (columns Y_{c3} and Y_{c4}), figural originality expressed as raw scores only (column Y_{c5}), figural elaboration expressed as raw scores and as standard scores (columns Y_{c7} and Y_{c8}), and composite figural

TABLE X

MULTIPLE CORRELATIONS AND THEIR SIGNIFICANCE: (*F* TEST) FIGURAL CREATIVITY

Grade	Fluency		Flexibility		Originality		Elaboration		Composite Creativity
	Raw Scores	Standard Scores	Raw Scores	Standard Scores	Raw Scores	Standard Scores	Raw Scores	Standard Scores	Standard Scores
	Y_{c1}	Y_{c2}	Y_{c3}	Y_{c4}	Y_{c5}	Y_{c6}	Y_{c7}	Y_{c8}	Y_{c9}
First N=242 *R*	.317**	.319**	.330**	.326**	.243**	.142	.184*	.190*	.302**
Third N=264 *R*	.378**	.374**	.301**	.305**	.377**	.379**	.148	.154	.297**
Fifth N=215 *R*	.282**	.304**	.118	.115	.108	.106	.239**	.252**	.045

R = Multiple Correlation.
* = Next to the correlation indicates significance at the .05 level.
** = Indicates significance at the .01 level.

creativity expressed as standard scores only (column Y_{c9}).

On the third grade level, the correlations between seven dimensions of creativity, out of a possible nine dimensions of creativity, and the combined independent variables of sex, intelligence, and socio-economic status, were significant at the .01 level. These correlation coefficients were on the criterion dimensions of figural fluency expressed as raw scores and as standard scores (columns Y_{c1} and Y_{c2}), figural flexibility expressed as raw scores and as standard scores (columns Y_{c5} and Y_{c6}), and composite figural creativity expressed as standard scores only (column Y_{c9}).

On the fifth grade level, the correlations between four dimensions of creativity, out of a possible nine dimensions of creativity, and the combined independent variables of sex, intelligence, and socio-economic status, were significant at the .01 level. These correlation coefficients were on the criterion dimensions of figural fluency expressed as raw and as standard scores (columns Y_{c1} and Y_{c2}), and figural elaboration expressed as raw scores and as standard scores (columns Y_{c7} and Y_{c8}).

Interpretation. In those cases where the correlation coefficients were significant, interpretation was made that sex, intelligence, and socio-economic status together had value for prediction of the criterion creative thinking dimension involved. The null hypothesis that these values do not have any predictive value was rejected.

B. Multiple correlation coefficients: verbal creative thinking (Table XI). On the first grade level the correlations between four dimensions of creativity, out of a possible seven dimensions of creativity, and the combined independent variables of sex, intelligence, and socio-economic status, were significant at the .05 level. These correlation coefficients were on the criterion dimensions of verbal flexibility expressed as raw scores and as standard scores (columns Y_{c3} and Y_{c4}), and verbal originality expressed as raw scores and as standard scores (columns Y_{c5} and Y_{c6}).

On the third grade level, the correlations between two dimensions of creativity, out of a possible seven dimensions of creativity, and the combined independent variables of sex, intelligence, and socio-economic status, were significant at the .05 level. These correlation coefficients were on the criterion dimensions of verbal originality expressed as raw scores and as standard scores (columns Y_{c5} and Y_{c6}).

On the fifth grade level, no correlations were significant between dimensions of creativity and the combined variables of sex, intelligence, and socio-economic status.

TABLE XI

MULTIPLE CORRELATIONS AND THEIR SIGNIFICANCE: (F TEST) VERBAL CREATIVITY

Grade	Fluency		Flexibility		Originality		Composite Creativity
	Raw Scores	Standard Scores	Raw Scores	Standard Scores	Raw Scores	Standard Scores	Standard Scores
	Y_{c1}	Y_{c2}	Y_{c3}	Y_{c4}	Y_{c5}	Y_{c6}	Y_{c7}
First N=167 R	.185	.168	.219*	.220*	.244*	.246*	.210
Third N=166 R	.187	.190	.194	.178	.237*	.246	.212
Fifth N=168 R	.104	.100	.120	.118	.086	.108	.102

R = Multiple correlation.
* = Significance at the .05 level.
Note: Y_{c7} and Y_{c8} are used for elaboration on figural creativity only.

Interpretation. In those cases where the correlation coefficients were significant, interpretation was made that sex, intelligence, and socio-economic status, together, had value for prediction of the criterion creative thinking dimension involved. The null hypothesis that these values did not have any predictive value was rejected.

Hypothesis to Subproblem 1

The results reported in Tables X and XI supported the original hypothesis set forth in this research that multiple correlations between three independent variables (sex, intelligence, and socio-economic status) and the dependent variables (dimensions of creativity) progressively decreased as the grade level and the age of culturally advantaged children and culturally deprived children increased. In other words, one could identify creative children on these verbal and figural criterion tasks more accurately (with greater confidence) on the first and third grade levels, than one could on the fifth grade level, given the present information of sex, intelligence, and socio-economic status. According to the results herein, one could not predict the performance on verbal creativity tasks on the fifth grade level on any criterion dimension.

C. Multiple linear regression analysis: figural creativity (Table XII). Partial regressions or b coefficients indicated the measure of increase in creativity (dimensions of fluency, flexibility, originality, elaboration, and total creativity) when all other variables were kept constant; and the particular independent variable (sex, intelligence, or socio-economic status) was changed by one unit.

An examination of results in Table XII on three regression coefficients or b coefficients of sex, intelligence, and socio-economic status, and their significance on the criterion dimension of figural creativity, supported the results on multiple correlations of the combined variables seen in Tables X and XI. There were more partial regression coefficients having significance at the first grade level than there were at the third and fifth grade levels.

Criterion, figural fluency: first, third, and fifth grades (Table XII, Columns Y_{c1} and Y_{c2}). On the first grade level, the b coefficients of sex, in favor of females (shown by the negative signs), and the b coefficients of socio-economic status, in favor of culturally advantaged children (shown by the positive signs), were significant (.05 and .01 levels, respectively), on the dimension of figural

TABLE XII

REGRESSION COEFFICIENTS AND THEIR SIGNIFICANCE: FIGURAL CREATIVITY

Grade		Fluency Raw Scores	Fluency Standard Scores	Flexibility Raw Scores	Flexibility Standard Scores	Originality Raw Scores	Originality Standard Scores	Elaboration Raw Scores	Elaboration Standard Scores	
		Y_{c1}	Y_{c2}	Y_{c3}	Y_{c4}	Y_{c5}	Y_{c6}	Y_{c7}	Y_{c8}	Y_{c9}
First										
Sex	b	-2.097	-2.979	- .896	-1.662	-1.822	- 1.890	- 6.246	-2.818	- 9.350
	z	-2.444*	-2.427*	-1.388	-1.369	-1.109	- 1.001	- 1.314	-1.339	- 1.986*
IQ	b	- .028	- .039	- .015	- .027	- .088	- .056	- .079	- .035	- .158
	z	- .112	-1.096	- .084	- .772	- .185	- 1.017	- .575	- .583	- 1.154
SE	b	4.352	6.272	3.646	6.730	7.342	4.519	13.584	6.199	2.372
	z	4.150**	4.182**	4.462**	4.539**	3.658**	1.367	2.340*	2.412*	4.125**
Third										
Sex	b	-2.154	-3.048	-1.547	-2.982	-3.978	- 4.187	- 1.442	- .727	-10.945
	z	-2.192*	-2.083*	-2.412*	-2.496*	-2.030*	- 1.926	- .322	- .359	- 2.062*
IQ	b	- .031	- .027	- .007	- .013	- .051	- .061	.218	.098	.004
	z	-1.121	- .661	- .396	- .398	- .912	- .973	1.688	1.687	.026
SE	b	-4.651	-7.605	-2.468	-4.640	-9.799	-10.892	- .258	.131	23.006
	z	-3.422**	3.758**	-2.782**	-2.809**	-3.617**	- 3.623**	- .041	.047	.313
Fifth										
Sex	b	- .330	- .991	- .519	- .797	-1.188	- 1.442	5.512	1.644	- 1.586
	z	- .322	- .662	- .768	- .625	- .582	- .622	.923	.681	- .269
IQ	b	- .009	- .000	- .013	- .020	.062	.006	.128	.054	.083
	z	- .308	- .367	- .626	- .511	.988	.924	.690	.727	.458

b = the regression coefficient.
z = to b divided by the standard deviation of b.
* = Significance at the .05 level, since z is greater than 1.96.
** = Significance at the .05 level, since z is greater than 2.58.
Note: (-) sign prefixing sex means in favor of females.
(-) sign prefixing IQ means in favor of low intelligence.
(-) sign prefixing socio-economic status means in favor of culturally deprived.

fluency, expressed as raw scores and as standard scores. The _b_ coefficients of sex showed that the difference (in favor of females) between the average male and the average female was 2.097 points (raw scores) and 2.979 (standard scores) when all other variables (in this case, intelligence and socio-economic status) were held constant. All other variables remaining constant, culturally advantaged children performed 4.352 points (raw scores) and 6.272 points (standard scores) better than culturally deprived children on the dimension of figural fluency.

On the other hand, on the third and fifth grade levels the culturally deprived children were superior in performance to culturally advantaged children and results were in favor of females.

Interpretation. The above results referred to figural fluency only and not to any of the other dimensions, such as flexibility, originality, elaboration, and total battery, which are discussed later in the chapter. The higher level of performance of the culturally advantaged population on figural tests of creativity at the earliest years of school may be the result of greater experiences on tasks involving manual dexterity (working with a pencil).

Criterion, figural flexibility, first, third, and fifth grades (Table XII, Columns Y_{c3} and Y_{c4}). On the first grade level, the b coefficients of socio-economic status, in favor of culturally advantaged children (shown by the positive coefficient), were significant (.01 level) on the dimension of figural flexibility, expressed as raw and as standard scores. All other variables remaining constant (in this case the variables of sex and intelligence), culturally advantaged children performed 3.646 (raw scores) and 6.730 (standard scores) better than culturally deprived children on the dimension of figural flexibility.

At the third grade level, b coefficients of sex and socio-economic status were significant (.05 and .01 levels, respectively).

No significant differences were shown by separate b coefficients of sex, intelligence, or socio-economic status on this dimension on the fifth grade level.

While the culturally advantaged performed significantly better on flexibility in the first grade, the culturally deprived performed significantly better in the third grade.

Criterion, figural originality: first, third, and fifth grades (Table XII, Columns Y_{c5} and Y_{c6}). On the first grade level, the b coefficients of socio-economic status in favor of culturally advantaged children (shown by positive coefficients), were significant (.01 level) on the dimension of figural originality, expressed as raw scores only. All other variables remaining constant (in this case the variables of sex and intelligence), culturally advantaged children performed 7.342 points (raw scores) better than culturally deprived children on the dimension of figural originality.

On the third grade level, b coefficients of sex (in favor of females), shown by the negative sign, and of socio-economic status (in favor of culturally deprived), were significant (.05 and .01 levels), respectively, on the dimension of figural originality, expressed as raw scores (in the case of the sex) and raw and standard scores (in the case of the socio-economic status). The b coefficients of sex showed that the difference (in favor of females) between the average male and the average female was 3.978 points (raw scores) when all other variables (in this case, intelligence and socio-economic status) were held constant. All other variables remaining constant, culturally deprived performed 9.799 points (raw scores) and 10.892 points (standard scores) better than culturally advantaged children on the dimension of figural originality.

No significant differences were shown by separate b coefficients of sex, intelligence, or socio-economic status on this dimension on the fifth grade level.

While the culturally advantaged performed significantly better on originality in the first grade, the culturally deprived performed significantly better in the third grade. There were no differences shown by either culturally advantaged or culturally deprived children in the fifth grade.

Criterion, figural elaboration: first, third, and fifth grades (Table XII, Columns $\underline{Y}_{c7}$ and $\underline{Y}_{c8}$). On the first grade level, the b coefficients of socio-economic status, in favor of culturally advantaged children (shown by positive coefficients) were significant (.05 level) on the dimension of figural elaboration, expressed as raw scores and as standard scores. All other variables remaining constant (in this case, the variables of sex and intelligence), culturally advantaged children performed 13.584 points (raw scores), and 6.199 points (standard scores), better than culturally deprived children on the dimension of figural elaboration.

On the third grade level, no significant differences were shown by separate b coefficients of sex, intelligence, or socio-economic status on this dimension.

On the fifth grade level, b coefficients of socio-economic status (in favor of the culturally advantaged children), were significant (.05 level) on the dimension of figural elaboration, expressed as standard scores only. All other variables remaining constant, culturally advantaged performed 6.656 points (standard scores) better than culturally deprived children on the dimension of figural elaboration.

Criterion, composite figural creativity: first, third, and fifth grades (Table XII, Column Y_{c9}). On the first grade level, the _b_ coefficients of sex, in favor of females (shown by the negative sign), and the _b_ coefficients of socio-economic status, in favor of culturally advantaged children (shown by the positive sign), were significant (at the .05 and .01 levels, respectively), on the total test score or composite figural creativity test, expressed as standard scores.

On the third grade level, females again did significantly better than males with no other significant _b_ coefficients of intelligence and socio-economic status on this dimension.

No significant differences were shown by separate _b_ coefficients of sex, intelligence, or socio-economic status on this dimension on the fifth grade level.

Summary of patterns of figural creativity: first, third, and fifth grades (Table XII). On the first grade level, significant b coefficients representing socio-economic status, were in favor of the culturally advantaged population. On third and fifth grades, however, significant b coefficients, representing socio-economic status, were in favor of the culturally deprived children (with the one exception of figural elaboration, in which culturally advantaged children excelled). All significant b coefficients of sex, were consistently in favor of females on all grade levels. (No significant differences in male scores and in female scores occurred consistently for verbal creativity, discussed in the next section of the paper.)

D. Regression analysis on verbal creativity, first, third, and fifth grades (Table XIII). Results on regression coefficients (b coefficients) for three variables of sex, intelligence, and socio-economic status, and their significance for verbal creativity supported results on multiple correlations of the combined variables seen in Tables X and XI. The regression coefficients of sex, intelligence, and socio-economic status were significant (at the .05 and .01 levels) in many more cases at the first and third grade levels than at the fifth grade level for verbal creativity.

In Table XIII, it was noted that there was a difference in favor of deprived children, all other things remaining the same (columns Y_{c1} and Y_{c2}), for fluency (number of

TABLE XIII

REGRESSION COEFFICIENTS AND THEIR SIGNIFICANCE: VERBAL CREATIVITY

		Fluency Raw Scores	Fluency Std. Scores	Flexibility Raw Scores	Flexibility Std. Scores	Originality Raw Scores	Originality Std. Scores	Composite Creativity
		Y_{c1}	Y_{c2}	Y_{c3}	Y_{c4}	Y_{c5}	Y_{c6}	Y_{c9}
First Grade								
Sex	b	- 1.509	- .402	-1.068	-1.438	- 2.997	-1.650	- 3.491
	z	- .402	- .303	- .780	- .841	- .502	- .669	- .677
IQ	b	.191	.063	.109	.136	.220	.100	.301
	z	1.709	1.611	2.691**	2.68**	1.244	1.377	1.964*
SE	b	-10.466	-3.346	-2.525	-3.199	- 2.249	-9.340	-15.886
	z	- 2.301*	-2.084*	-1.524	- .097	- 3.115**	-3.133**	- 2.550*
Third Grade								
Sex	b	- 4.766	-1.639	-3.160	-3.510	-11.726	-5.422	-10.527
	z	- 1.212	-1.188	-2.060*	-1.859	- 2.051*	-2.197*	- 1.941
IQ	b	- .022	- .095	.041	.050	- 8.88	- .028	.013
	z	- .198	- .450	.960	.953	- .550	- .402	.861
SE	b	- 7.761	-2.749	-3.142	-3.634	-10.863	-5.171	-11.555
	z	- 1.521	-1.535	-1.578	-1.483	- 1.464	-1.614	- 1.635
Fifth Grade								
Sex	b	- 2.047	- .656	-1.212	-1.486	- 1.844	- .635	- 2.778
	z	- .535	- .488	- .805	- .811	- .308	- .262	- .521
IQ	b	- .089	.029	.064	.077	.104	.056	.163
	z	.764	.725	1.412	1.378	.574	.762	1.003
SE	b	- 6.425	-2.188	-1.774	-2.120	- 8.510	-4.427	- 8.737
	z	- 1.242	-1.202	- .870	- .854	- 1.051	-1.351	- 1.211

b = beta weights.
z = test for the significance of regression.
* = Significance at the .05 level, since z is greater than 1.96.
** = Significance at the .01 level, since z is greater than 2.58.
Note: (-) sign prefixing sex means in favor of females.
(-) sign prefixing IQ means in favor of low intelligence.
(-) sign prefixing socio-economic status means in favor of culturally deprived.

ideas spoken to the researcher). In this case the correlations, shown by negative signs, indicated that culturally deprived children performed better, above the .05 level of significance than the culturally advantaged on fluency, all other variables remaining the same.

Continuing analysis on the first grade level, it was noted that the b coefficient for intelligence was significant at the .01 level on the flexibility dimension of creative thinking (columns Y_{c3} and Y_{c4}). Since these b coefficients (positive), were significant (.05 level) results indicated that children with higher intelligence did better than those with lower intelligence on the dimension of flexibility (ability to shift from one idea to another). This was the only incidence where intelligence seemed to have a significant effect on creativity scores. In columns Y_{c5} and Y_{c6}, it was noted that socio-economic status was significant at the .01 level in the first grade. Since the b coefficient (prefixed by a negative sign) was significant, there was indication that culturally deprived children did significantly better than culturally advantaged on the dimension of originality in the first grade. In column Y_{c9}, on composite verbal creative thinking, it was noted that intelligence and socio-economic status both have effects, with the sex of the child not significantly correlated with total creativity; i.e., there were no significant differences between male scores and female scores on the first grade level on performance on verbal creative thinking tasks.

In Table XIII (columns Y_{c1} and Y_{c2}), concerning verbal fluency, expressed as raw scores and as standard scores, no partial effects of sex, intelligence, or socio-economic status (b coefficients) were significant at the .01 level. The regression coefficient (Y_{c3} column) was significant for sex of the child, in favor of females on the dimension of flexibility (for raw scores only) at the .05 level with no significant regressions for intelligence or socio-economic status. In this case, there was a significant relationship (-3.160), prefixed by a negative sign, indicating that females do significantly better than males on flexibility, all other variables remaining constant. The same was true for originality (columns Y_{c5} and Y_{c6}). No significant partial effects of sex, intelligence, or socio-economic status were indicated for the total battery (column Y_{c9}), on the third grade level.

There were no significant regression coefficients for sex, intelligence, or socio-economic status on the fifth grade level, indicating that none of the three independent variables (sex, intelligence, or socio-economic status) significantly affected creativity (on any dimension) on this grade level.

Summary of patterns on regression analysis of verbal creativity (Table XIII). Partial regression coefficients were consistently significant (.05 level) in favor of culturally deprived at the first grade level. As in figural creativity, all other things held constant, where there were significant differences, results were in favor of the females, results that occurred only at the third grade level. These results accorded with those reported by Elizabeth Andrews (page 12 of this report concerning related research) in which significant differences were in favor of females.

The one place where intelligence seemed to have a significant effect on creativity was the verbal flexibility dimension (columns Y_{c3} and Y_{c4}, Table XIII). This was true for the first grade only. Since the *b* coefficient was a positive one, .109, the average increase of one unit of verbal flexibility would be .109 with one unit increase in intelligence.

E. *Partial correlations: first, third, and fifth grades (Table XIV).* Solution to subproblem 2 was obtained from results on partial correlations set forth in Table XIV. Data were treated in the manner stated in Chapter III, page 47 of this report.

TABLE XIV

PARTIAL CORRELATION OF PPVT AND CREATIVITY FOR FIXED SEX AND SOCIO-ECONOMIC STATUS BY GRADE LEVEL

	Fluency Raw Scores	Fluency Standard Scores	Flexibility Raw Scores	Flexibility Standard Scores	Originality Raw Scores	Originality Standard Scores	Elaboration Raw Scores	Elaboration Standard Scores	Composite Creativity
Grade	Y_{c1}	Y_{c2}	Y_{c3}	Y_{c4}	Y_{c5}	Y_{c6}	Y_{c7}	Y_{c8}	Y_{c9}
	Figural Creativity								
First	-.07	-.07	-.05	-.05	-.11	-.06	-.03	-.03	-.07
Third	-.07	-.04	-.03	-.03	-.06	-.06	.11	.11	-.001
Fifth	-.02	-.03	-.04	-.03	.06	.0	.05	.05	.03
	Verbal Creativity								
First	.13	.13	.20*	.20*	.09	.10			.15
Third	-.01	-.02	.08	.08	-.04	.03			.008
Fifth	.06	.06	.10	.10	.04	.06			.08

*Significance at the .05 level.

Hypothesis to Subproblem 2

Hypothesis 2 of this research stated that the partial correlations between the intelligence quotient and creativity scores, when the influence of two other variables (sex and socio-economic status) were held constant, would progressively decrease as the age and the school level of culturally advantaged children and culturally deprived children increased.

An examination of the table on partial correlations, Table XIV indicated that partial correlations were low and not significant (except for one isolated case). Hence, a decline in partial correlations would not be significant and the hypothesis stated above was not tenable.

Scatter diagrams depicting these low relationships between intelligence, as measured by the *Peabody Picture Vocabulary Test*, and the sixteen dimensions of creativity, as measured by the Torrance tests, are appended to this study.

Interpretation. From the tables on partial correlations, it appeared that intelligence, by itself, had very little relationship to the creative ability of the child, when all other independent variables (sex and socio-economic status) were held constant. The one exception to this pattern of low relationship was the dimension of verbal flexibility.[1] This finding confirmed the importance of emphasizing creativity as a separate dimension of the thinking of the child--a measurable trait of mind independent of intelligence.

Hypothesis to Subproblem 3

The hypothesis that the cultural background of the child would have a significant effect on the creativity scores of children on three grade levels; i.e., first, third, and fifth grade levels, was answered by regression analysis made for subproblem 1. For purposes of clarity, Table XV pooled data from Tables XII and XIII on socio-economic status and dimensions of creativity for each grade level; i.e., first, third, and fifth grades.

Summary

The results in Table XV, indicated that there were more significant regression coefficients (at the .05 and .01 levels) representing socio-economic status on dimensions of

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[1] Only one dimension in Table XIV, verbal flexibility, expressed as raw scores and as standard scores (columns Y_{c3} and Y_{c4}), was significantly correlated (.05 level) with intelligence, when the two other independent variables (sex and socio-economic status) were held constant. These results were supported by the positive regression coefficient on intelligence in Table XIII (columns Y_{c3} and Y_{c4}) which was significant at the .01 level on the dimension of verbal flexibility, when the two other independent variables (sex and socio-economic status) were held constant. Results were in favor of those children having high intelligence.

TABLE XV

REGRESSION COEFFICIENTS OF SOCIO-ECONOMIC STATUS AND THEIR SIGNIFICANCE: VERBAL AND FIGURAL CREATIVITY

Grade	Fluency Raw Scores Y_{c1}	Fluency Standard Scores Y_{c2}	Flexibility Raw Scores Y_{c3}	Flexibility Standard Scores Y_{c4}	Originality Raw Scores Y_{c5}	Originality Standard Scores Y_{c6}	Elaboration Raw Scores Y_{c7}	Elaboration Standard Scores Y_{c8}	Composite Scores Y_{c9}
	Figural Creativity								
First									
b	4.352	6.272	3.646	6.730	7.432	4.519	13.584	6.199	2.372
z	4.150**	4.182**	4.462**	4.539**	3.658**	1.367	2.340*	2.412*	4.125**
Third									
b	-4.651	-7.605	-2.468	-4.640	-9.799	-10.892	- .258	.131	23.000
z	-3.422**	-3.758**	-2.782**	-2.809**	-3.617**	- 3.623**	- .041	.047	.313
Fifth									
b	-3.908	-6.054	.412	-1.051	-4.204	- 4.569	14.884	6.656	5.018
z	-2.779**	-2.945**	- .444	- .600	-1.500	- 1.435	1.814	2.008*	- .621
	Verbal Creativity								
First									
b	-10.66	-3.346	-2.525	-3.199	-2.249	- 9.340			-15.886
z	- 2.301*	-2.084*	-1.524	- .097	-3.115**	- 3.133**			2.550*
Third									
b	- 7.761	-2.749	-3.142	-3.634	-10.863	- 5.171			- 1.555
z	- 1.521	-1.535	-1.578	-1.483	- 1.464	- 1.614			- 1.635
Fifth									
b	- 6.425	-2.188	-1.774	-2.120	- 8.510	- 4.427			- 8.737
z	- 1.242	-1.202	- .870	- .854	- 1.051	- 1.351			1.211

b = Regression coefficient
z = to b divided by the standard deviation of b.
* = Significance at the .05 level, since z is greater than 1.96.
** = Significance at the .01 level, since z is greater than 2.58.

verbal and figural tests at the first grade level than there were on the third and fifth grade levels. Thus, more accurate (with greater confidence) prediction could be made on the basis of the present information on socio-economic background on the first grade level than could be made on the third and fifth grade levels. In other words, culturally advantaged children and culturally deprived children showed greater differences in creative thinking at the earlier years than they did in the later years of school.

At the first grade level, where _b_ coefficients representing socio-economic background were significant on the dimension of _verbal_ creativity tests, results indicated that culturally deprived children were superior to culturally advantaged children on the dimensions of fluency, expressed as raw scores and as standard scores; originality, expressed as raw scores and as standard scores; and composite verbal creativity, expressed as standard scores. The effect of socio-economic background (difference between high and low socio-economic groups), therefore, was in favor of culturally deprived children.

At the third grade level and fifth grade level, there were no significant differences shown between the culturally advantaged children and culturally deprived children, all other variables remaining constant.

Hence, it was shown by these results, that deprived children were not necessarily less creative, and in many cases were more creative, all other variables of sex and intelligence remaining constant, than culturally advantaged children at the three grade levels.

At the first grade level, where _b_ coefficients of socio-economic status were significant on the dimensions _figural_ creativity tests, results indicated that culturally advantaged children were superior in performance to culturally deprived children on the dimensions of fluency, expressed as raw scores and as standard scores; flexibility, expressed as raw scores and as standard scores; originality, expressed as raw scores only; elaboration, expressed as raw scores and as standard scores; and composite figural creativity, expressed as standard scores. The effect of socio-economic background (difference between high and low socio-economic groups) were in favor of culturally advantaged children on the first grade level only.

At the third grade level, however, results were in favor of culturally deprived children, who achieved higher scores than culturally advantaged children on figural dimensions of fluency, expressed as raw scores and as standard scores. The effect of socio-economic background (difference between high and low socio-economic groups) was, therefore, in favor of culturally deprived children.

At the fifth grade level, results were similar to those obtained at the third grade level, with significant b coefficients on the dimensions of fluency, expressed as raw and standard scores. The one exception to this finding was the finding that culturally advantaged performed better than culturally deprived children on the dimension of elaboration, expressed as standard scores only.

Hypothesis to Subproblem 4

The hypothesis that at three grade levels (i.e., first, third, and fifth grade levels), there would be statistically significant differences between the sexes in scores made on creativity tests when intelligence and socio-economic background were held constant, was answered by regression analysis made for subproblem 1. For purposes of clarity, data from Tables XII and XIII were pooled into one table, Table XVI, which gave partial regression coefficients representing the sex of children on the dimensions of creativity on figural and verbal tests on three grade levels, i.e., first, third, and fifth grade levels.

Summary

As shown in Table XVI, where b coefficients representing the sex of children were significant on the dimensions of figural tests, results indicated that females were superior to males on the dimensions of flexibility and

TABLE XVI

REGRESSION COEFFICIENTS OF SEX AND THEIR SIGNIFICANCE: VERBAL AND FIGURAL CREATIVITY

Grade	Figural Creativity								
	Fluency Raw Scores	Fluency Standard Scores	Flexibility Raw Scores	Flexibility Standard Scores	Originality Raw Scores	Originality Standard Scores	Elaboration Raw Scores	Elaboration Standard Scores	Composite Scores
	Y_{c1}	Y_{c2}	Y_{c3}	Y_{c4}	Y_{c5}	Y_{c6}	Y_{c7}	Y_{c8}	Y_{c9}
First									
b	-2.097	-2.979	- .896	-1.662	- 1.822	-1.890	-6.246	-2.818	- 9.350
z	-2.444*	-2.427*	-1.388	-1.369	- 1.109	-1.001	-1.314	-1.339	- 1.986*
Third									
b	-2.154	-3.048	-1.547	-2.982	- 3.978	-4.187	-1.442	- .727	-10.945
z	-2.192*	-2.083*	-2.412*	-2.496*	- 2.030*	-1.926	- .322	- .359	- 2.062*
Fifth									
b	- .330	- .991	- .519	- .797	- 1.188	-1.442	5.512	1.644	- 1.586
z	- .322	- .662	- .768	- .625	- .582	- .622	.923	.681	- .269
	Verbal Creativity								
First									
b	-1.509	- .402	-1.068	-1.438	- 2.997	-1.650			- 3.491
z	- .402	- .303	- .780	- .841	- .502	- .669			- .677
Third									
b	-4.766	-1.639	-3.160	-3.510	-11.726	-5.422			-10.527
z	-1.212	-1.188	-2.060*	-1.859	- 2.051*	-2.197*			- 1.941
Fifth									
b	-2.047	- .656	-1.212	-1.486	- 1.844	- .635			- 2.778
z	- .535	- .488	- .805	- .811	- .308	- .262			- .521

b = B weights.
z = Test for the significance of the regression.
* = Significance at the .05 level, since z is greater than 1.96.

originality, expressed as raw scores and as standard scores on the third grade level only. Where b coefficients representing the sex of children were significant on the dimensions of verbal tests, results indicated that females were superior to males on the dimensions of fluency, expressed as raw and standard scores; and total battery, expressed as standard scores at the first grade level; all dimensions except elaboration at the third grade level; and on no dimensions at the fifth grade level. In sum, all significant b coefficients of sex were consistently in favor of females on all grade levels.

CHAPTER V

SUMMARY AND IMPLICATIONS

Summary

The purpose of this study was to determine and to analyze data on some of the most significant and unexplored educational relationships in the early school years, namely, between creativity and the variables of intelligence, sex, socio-economic status, age, and grade level.

In order to test hypotheses relating to the problem, tests of creativity and of intelligence were administered in selected District of Columbia elementary schools to 721 first, third, and fifth grade children from different socio-economic backgrounds. Children of each sex in each grade were tested for verbal intelligence, as measured by the *Peabody Picture Vocabulary Test*; and for creativity, as measured by the *Torrance Tests of Creative Thinking*, *Figural Form A* and *Verbal Form A*, formerly called the *Minnesota Tests of Creative Thinking*. The figural test included dimensions of fluency, flexibility, originality, elaboration, and composite scores on creativity. The verbal test included all these dimensions except elaboration.

To test hypotheses 1, 3, and 4, multiple regression coefficients were computed. To test hypothesis 1, the corresponding multiple correlations were also calculated. Hypothesis 2 called for the statistical method of partial correlation only. (The three statistical methods used were described in detail in Chapter III, pages 47-50.) These four hypotheses were as discussed below.

Hypothesis 1. Hypothesis 1 stated that multiple correlations between three independent variables (sex, intelligence, and socio-economic background) and the dependent variables (creativity test scores) would progressively decrease as the age and grade level of culturally advantaged children and culturally deprived children increased. Results supported the hypothesis.

Tables X and XI (pages 52 and 55) on figural and verbal tests of creativity showed more significant multiple correlations between the combined variables of sex, intelligence, and socio-economic background and the various dimensions of creativity in the first grade than in the third grade, and more in the third grade than in the fifth grade.

These results indicated the composite relationships only and they did not disclose differences in the relationship of each of the three variables (sex, intelligence, and socio-economic background) to creativity.

These findings were further supported by the partial regression coefficients of figural and verbal creativity. (See Tables XII and XIII.) More partial regression coefficients were significant at .05 and .01 levels showing differences in performance between culturally advantaged children and culturally deprived children, and between males and females, in the earlier years of school than in the later years. (Regression coefficients showed no consistently significant differences in creativity scores between high and low intelligence groups, when sex and socio-economic background were held constant.) In other words, whatever significant differences there were in the earlier years tended to disappear in the later years.

The particular differences between culturally advantaged children and culturally deprived children and between male scores and female scores were as discussed in connection with hypothesis 3 and hypothesis 4.

Hypothesis 2. Hypothesis 2 stated that the partial correlations between the intelligence quotients and the creativity test scores, when the influence of two other variables (sex and socio-economic background) were held constant, would progressively decrease as the age and grade level of culturally advantaged children and culturally deprived children increased. Results failed to support the hypothesis.

The table on partial correlations (Table XIV) showed that at three grade levels partial correlations were low and not significant (except for one isolated case[1]) between intelligence and creativity when the independent variables of sex and socio-economic background were held constant.

Scatter diagrams depicting these low relationships between intelligence and the various dimensions of creativity are appended to this study. (Appendixes H and I.)

Hypothesis 3. Hypothesis 3 stated that at three grade levels (i.e., first, third, and fifth grade levels), there would be statistically significant differences between the performance of culturally advantaged children and culturally deprived children on tests of creativity when the variables of sex and intelligence were held constant. Results tended to support this hypothesis but the diversity of the significant relationships made it difficult to generalize as to the superiority of performance of either the culturally advantaged or the culturally deprived.

Culturally advantaged children and culturally deprived children evidenced significant, but diverse, differences (as shown by significant *b* coefficients) on tests of *figural* creativity at different grade levels. At the first grade level, these coefficients were in favor of culturally advantaged children on the dimensions of fluency, flexibility, originality, elaboration, and composite scores. At the third grade level, these coefficients were significant on the dimensions of fluency, flexibility, and originality; and all of these favored the culturally deprived. At the fifth grade level, these coefficients were significant on the dimension of fluency, favoring the culturally deprived, and on the dimension of elaboration, favoring the culturally advantaged.

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[1] Only one dimension in Table XIV, verbal flexibility, was significantly correlated with intelligence, when the two other independent variables (sex and socio-economic background) were held constant. This occurred only at the first grade level.

Culturally advantaged children and culturally deprived children evidenced significant differences (as shown by significant b coefficients) on tests of verbal creativity in the first grade only. These coefficients favored culturally deprived children on the dimensions of fluency, originality, and composite scores.

These results showed the dependence of creativity on the independent variable of socio-economic background when the variables of sex and intelligence were held constant. This dependence tended to disappear as the age and the grade level of children increased.

Hypothesis 4. Hypothesis 4 stated that at three grade levels (i.e., first, third, and fifth grade levels), there would be statistically significant differences between the sexes in scores made on creativity tests when intelligence and socio-economic background were held constant. Results tended to support this hypothesis (Table XVI) but significant differences between the sexes (always in favor of females) on figural creativity occurred only at the first and third grade levels, and significant differences between the sexes on verbal creativity (always in favor of females) occurred at the first grade level only.

General Implications

The Torrance test scores had greatest relationship to the combined independent variables (sex, intelligence, and socio-economic background) at the earliest years of school. These relationships decreased as the age and the grade level of children increased.

While significant relationships were found between socio-economic status and creativity when other variables were held constant, these relationships did not follow a consistent pattern; in some instances they favored the advantaged and in other instances they favored the deprived. The incidence of these significant relationships tended to decrease with increasing age and grade level. These findings also indicated that the Torrance test materials, unlike the standard intelligence and achievement tests, were relatively neutral toward different socio-economic classes.

When other variables were held constant, the differences in significant test results favored the females over the males. There were greater instances of these significant differences at the third grade level on both verbal and figural tests.

Creativity scores were completely uncorrelated with intelligence scores, as measured by the Peabody Picture Vocabulary Test, confirming the importance of emphasizing creativity as a separate dimension of thinking.

Suggestions for Further Research

Further research is suggested for detailed exploration into the reasons for the decreasing relationships between socio-economic status and the creativity of children when the age and grade level are increased. Some possible areas accounting for the decreasing relationships might include the philosophies of the schools, the specific methods of teaching children, and the natural physiological and psychological development of children. Reasons for the occurrence of the superior performance in creativity of females over males, when other variables were held constant, at the third grade level, should also be explored.

An item analysis of the data collected for this research is suggested to study carefully the differences in the types of responses of culturally deprived and culturally advantaged children. While the Torrance tests did not seem to be biased generally toward any socio-economic group, certain aspects of the tests may be somewhat culturally oriented. For example, the standards for "common responses" on the Torrance tests seemed to be based on culturally advantaged groups, and this might account for the high level of performance on originality (uncommon responses) by culturally deprived children. On the other hand, the higher level of performance of the culturally advantaged population on figural tests of creativity at the earliest years may be the result of greater experience on tasks involving manual dexterity (working with a pencil). Further research might examine such possibilities.

Reasons for the higher level of performance of culturally deprived children on the dimensions of verbal fluency and verbal flexibility at the early school years should also be studied.

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APPENDIXES

APPENDIX A

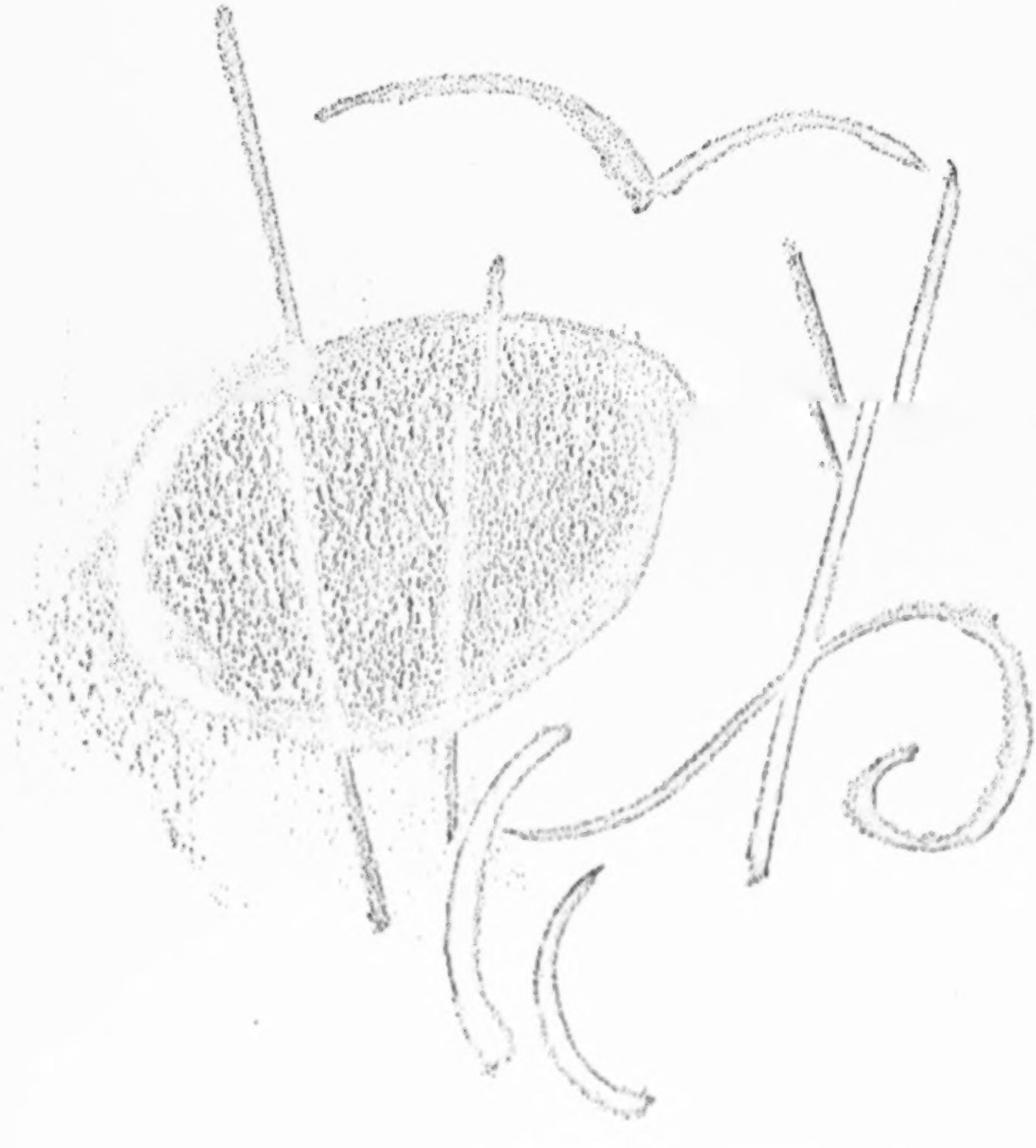
SAMPLES OF TESTS ADMINISTERED

Thinking Creatively With Pictures

Booklet A

Name ______________________________ Age ________ Sex ________ Grade ________

School ______________________ City ______________________ Date ______________



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Activity 1. PICTURE CONSTRUCTION

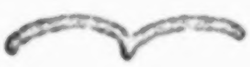
Below is a piece of colored paper in the form of a curved shape. Think of a picture or an object which you can draw with this piece of paper as a part. On the back of these shapes you will find a thin layer of paper that can be peeled away. Look. Now you can stick your colored shape wherever you want it to make the picture you have in mind. Stick yours on the next page where you want it and press down on it. Then add lines with your pencil or crayon to make your picture.

Try to think of a picture that no one else will think of. Keep adding new ideas to your first idea to make it tell as interesting and as exciting a story as you can.

When you have completed your picture, think up a name or title for it and write it at the bottom of the page in the space provided. Make your title as clever and unusual as possible. Use it to help tell your story.

Activity 2. PICTURE COMPLETION

By adding lines to the incomplete figures on this and the next page, you can sketch some interesting objects or pictures. Again, try to think of some picture or object that no one else will think of. Try to make it tell as complete and as interesting a story as you can by adding to and building up your first idea. Make up an interesting title for each of your drawings and write it at the bottom of each block next to the number of the figure.



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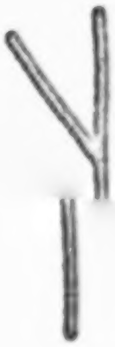

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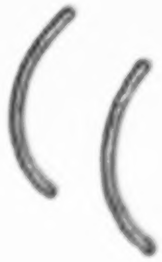

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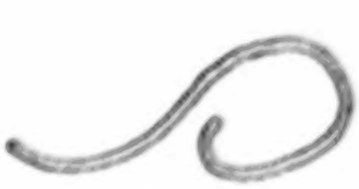
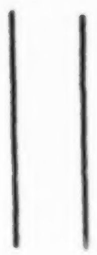


4. ______________________________

Activity 3. LINES

In ten minutes see how many objects or pictures you can make from the pairs of straight lines below and on the next two pages. The pairs of straight lines should be the main part of whatever you make. With pencil or crayon add lines to the pairs of lines to complete your picture. You can place marks between the lines, on the lines, and outside the lines—wherever you want to in order to make your picture. Try to think of things that no one else will think of. Make as many different pictures or objects as you can and put as many ideas as you can in each one. Make them tell as complete and as interesting a story as you can. Add names or titles in the spaces provided.



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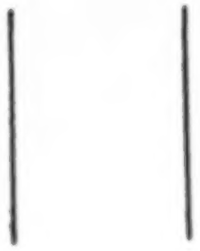

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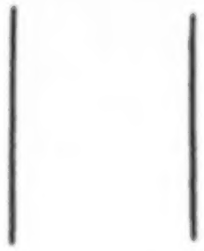

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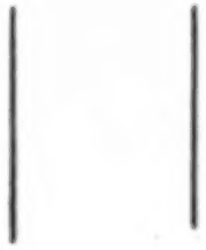

6.______________________

Thinking Creatively With Words

102

Booklet A

Name ______________________ Age ________ Sex ________

School ______________________ Grade ________

City ______________________

Date ______________________

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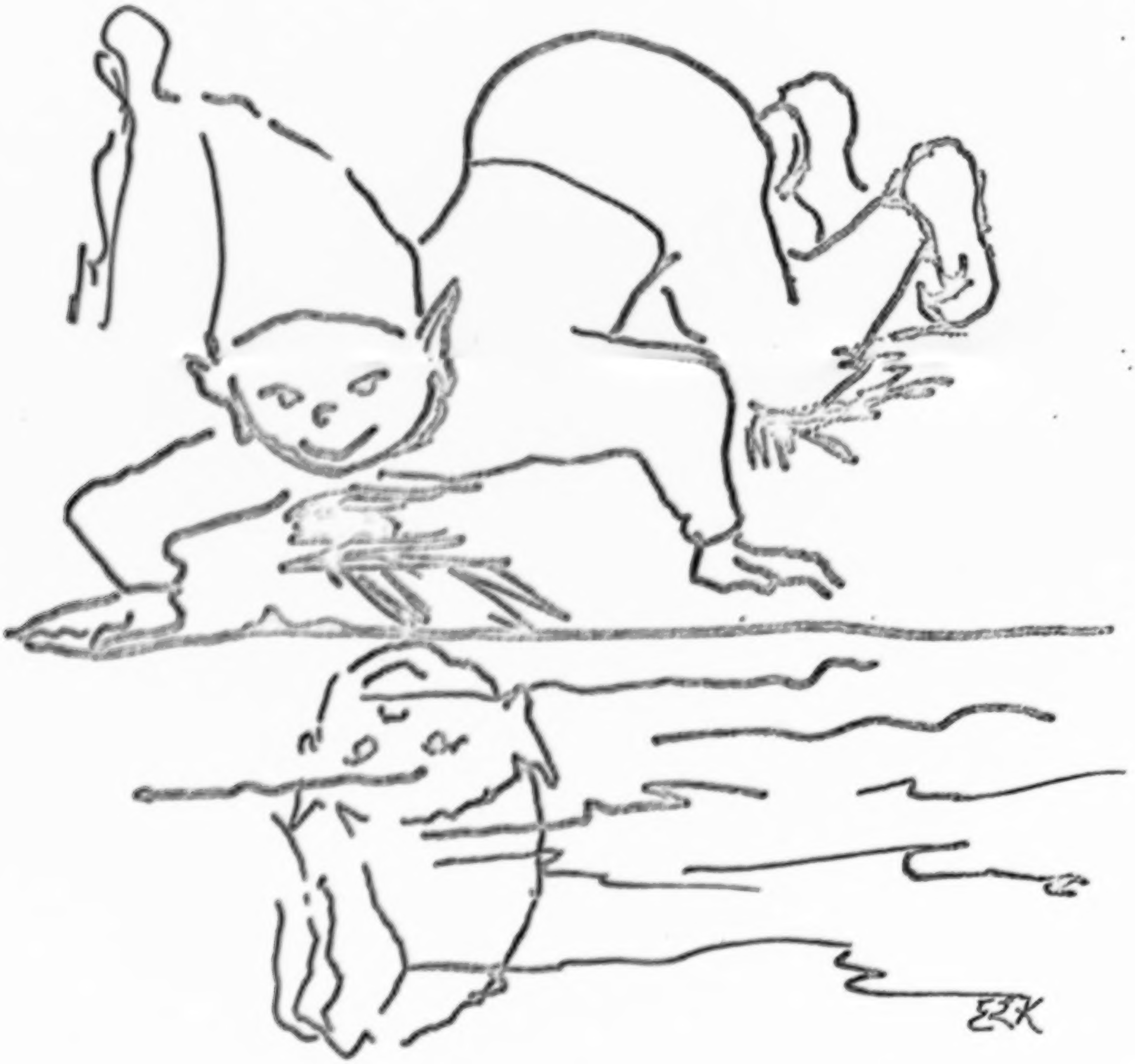
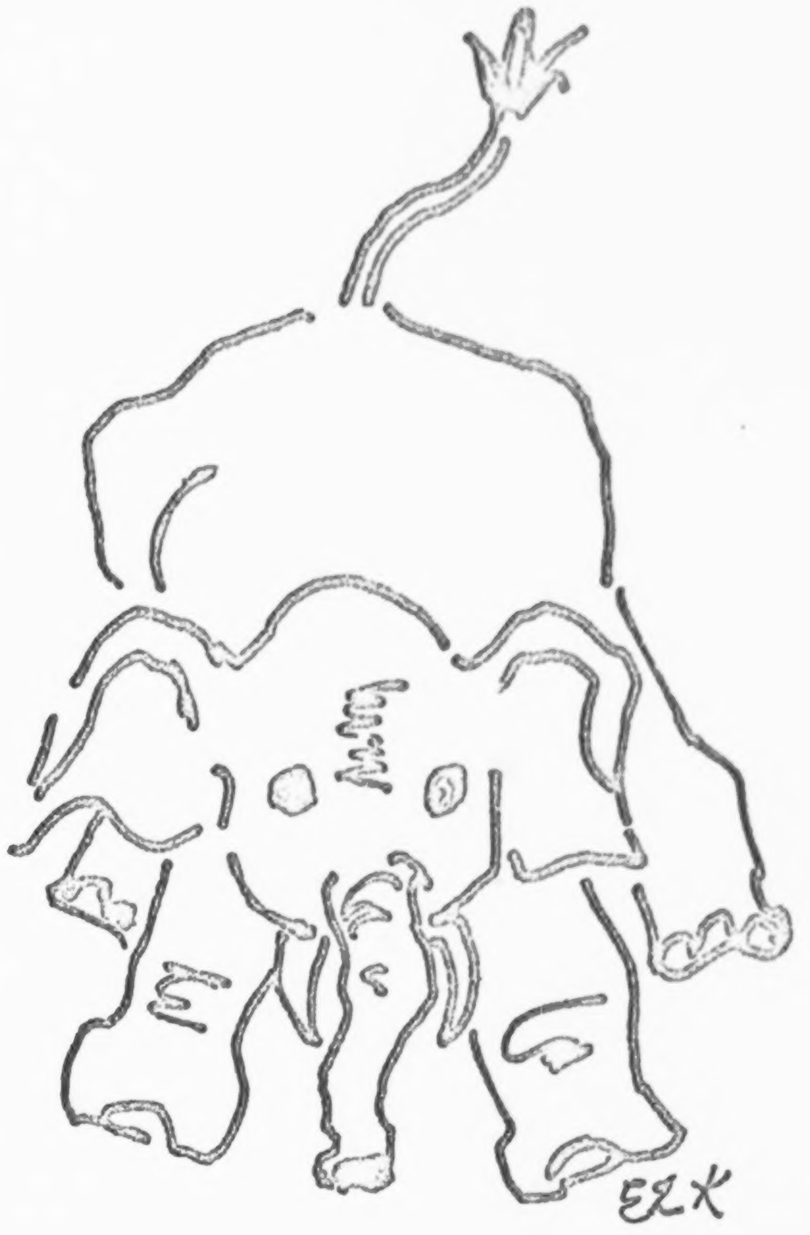
Activities 1-3: ASK-AND-GUESS

The first three activities will be based on the drawing below. These activities will give you a chance to see how good you are at asking questions to find out things that you don't know and in making guesses about possible causes and consequences of happenings. Look at the picture. What is happening? What can you tell for sure? What do you need to know to understand what is happening, what caused it to happen and what will be the result?



Activity 4: PRODUCT IMPROVEMENT

In the middle of this page is a sketch of a stuffed toy elephant of the kind you can buy in most dime stores for about one to two dollars. It is about six inches tall and weighs about a half pound. In the spaces on this page and the next one, list the cleverest, most interesting and unusual ways you can think of for changing this toy elephant so that children will have more fun playing with it. Do not worry about how much the change would cost. Think only about what would make it more fun to play with as a toy.



1.________________________________

2.________________________________

3.________________________________

4.________________________________

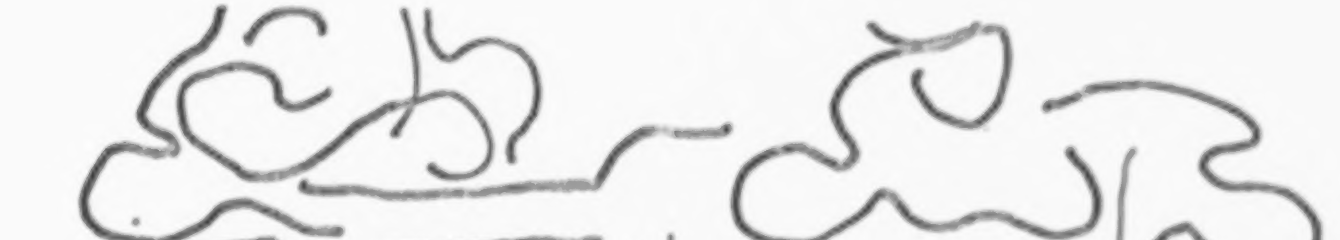
5.________________________________

Activity 7: JUST SUPPOSE

You will now be given an improbable situation—one that will probably never happen. You will have to *just suppose* that it has happened. This will give you a chance to use your imagination to think out all of the other exciting things that would happen IF this improbable situation were to come true.

In your imagination, *just suppose* that the situation described were to happen. THEN think of all of the other things that would happen because of it. In other words, what would be the consequences? Make as many guesses as you can.

The improbable situation—JUST SUPPOSE *clouds had strings attached to them which hang down to earth.* What would happen? List your ideas and guesses on the next page.



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  28 117.   1.  75.   0.   1.  29.   2.  121.   51. 4199.   31. 5500.   70. 6500.
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APPENDIX C

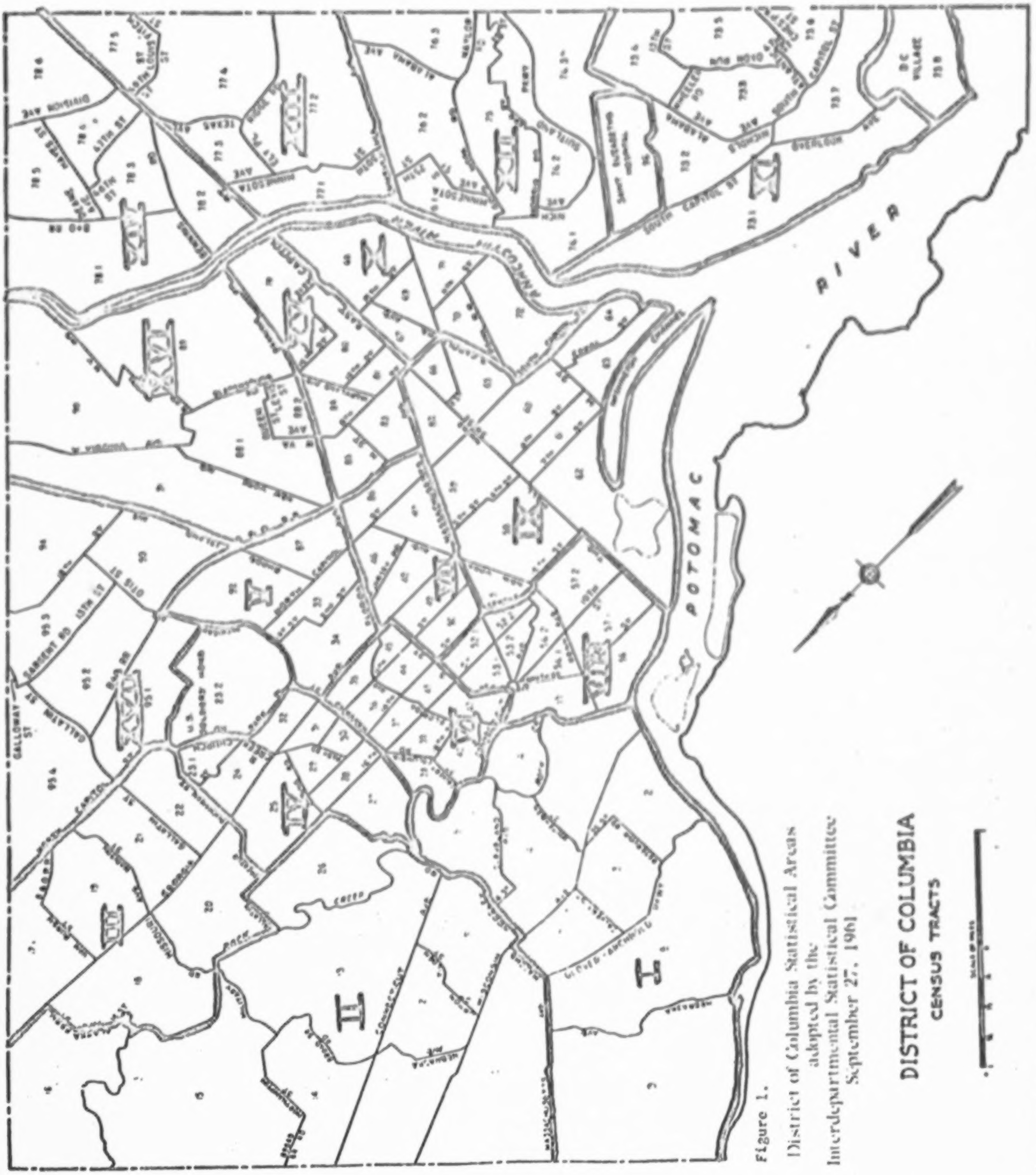

POTOMAC
RIVER
W. VIRGINIA AVE
SOUTH CAPITOL ST
GALLOWAY ST
SARGENT RD
D.C. VILLAGE
U.S. SOLDIERS' HOME

Figure 1.

District of Columbia Statistical Areas
adopted by the
Interdepartmental Statistical Committee
September 27, 1961

DISTRICT OF COLUMBIA
CENSUS TRACTS

APPENDIX D

ECONOMIC CHARACTERISTICS OF THE DISTRICT OF COLUMBIA

TABLE XVII

PERCENT DISTRIBUTION OF FAMILY INCOME IN 1960: STATISTICAL AREAS, DISTRICT OF COLUMBIA

Area	All Families	Families with Income			
		Under $1,000	$1,000 to $1,999	$2,000 to $2,999	$3,000 to $3,999
Total	100.0	4.0	5.4	7.9	10.6
Area I	100.0	1.8	2.2	2.2	3.3
Area II	100.0	1.6	2.0	2.3	2.4
Area III	100.0	2.2	3.0	4.7	7.3
Area IV	100.0	4.7	5.2	8.9	12.6
Area V	100.0	5.4	7.3	9.3	12.0
Area VI	100.0	5.7	7.7	12.1	12.9
Area VII	100.0	9.5	13.6	17.9	18.6
Area VIII	100.0	5.0	6.4	11.7	10.5
Area IX	100.0	7.0	9.3	13.3	14.9
Area X	100.0	6.3	8.9	12.5	16.2
Area XI	100.0	2.5	3.6	6.3	10.8
Area XII	100.0	3.1	5.2	7.2	10.4
Area XIII	100.0	3.4	4.6	6.5	10.8
Area XIV	100.0	5.4	6.7	9.3	15.8
Area XV	100.0	5.1	7.0	11.2	14.7
Area XVI	100.0	3.0	4.8	7.9	13.4
Area XVII	100.0	1.5	2.0	2.7	4.9
Institutional Tracts	100.0	0	0	0	0

TABLE XVII

PERCENT DISTRIBUTION OF FAMILY INCOME IN 1960: STATISTICAL AREAS, DISTRICT OF COLUMBIA (continued)

Area	Families with Income			
	$4,000 to $4,999	$5,000 to $5,999	$6,000 to $6,999	$7,000 to $7,999
Total	12.0	10.2	8.7	7.3
Area I	5.0	5.4	6.0	5.9
Area II	4.0	4.1	5.0	5.6
Area III	11.0	9.9	10.1	9.2
Area IV	14.8	11.2	8.5	6.7
Area V	12.6	11.2	10.5	8.1
Area VI	13.2	9.5	9.1	6.5
Area VII	13.1	8.4	6.4	4.2
Area VIII	10.5	8.5	7.5	6.4
Area IX	11.5	8.9	7.4	5.6
Area X	14.2	11.3	7.6	5.6
Area XI	14.7	14.4	13.3	10.5
Area XII	13.1	11.5	10.1	8.8
Area XIII	13.7	12.0	10.3	8.8
Area XIV	13.8	12.6	8.6	7.3
Area XV	16.5	11.6	8.3	6.6
Area XVI	16.7	13.8	9.6	8.2
Area XVII	9.0	10.9	10.1	9.3
Institutional Tracts	14.7	0	0	12.2

TABLE XVII

PERCENT DISTRIBUTION OF FAMILY INCOME IN 1960: STATISTICAL AREAS, DISTRICT OF COLUMBIA (continued)

Area	Families with Income				
	$8,000 to $8,999	$9,000 to $9,999	$10,000 to $14,999	$15,000 to $24,999	$25,000 and over
Total	6.7	5.5	13.7	5.7	2.3
Area I	5.3	6.0	23.2	18.5	15.2
Area II	6.3	6.0	28.9	21.8	10.0
Area III	8.7	7.8	18.9	6.2	1.0
Area IV	6.4	5.8	11.8	3.0	0.4
Area V	6.8	4.6	10.0	2.2	0.0
Area VI	5.1	4.0	9.4	3.8	1.0
Area VII	3.0	2.0	2.8	0.5	0.0
Area VIII	5.8	6.1	13.5	6.3	1.8
Area IX	4.0	2.9	9.5	4.3	1.4
Area X	5.6	3.3	6.8	1.5	0.2
Area XI	6.7	5.2	9.9	1.8	0.3
Area XII	8.5	6.5	12.6	2.6	0.4
Area XIII	8.9	6.1	11.9	2.8	0.2
Area XIV	6.5	5.3	7.4	1.2	0.1
Area XV	5.6	3.5	8.6	1.3	0
Area XVI	7.4	5.2	8.3	1.6	0.1
Area XVII	10.5	10.0	23.4	5.2	0.5
Area XVIII	12.2	7.3	26.8	26.8	0

TABLE XVIII

OCCUPATION OF EMPLOYED POPULATION: STATISTICAL AREAS, DISTRICT OF COLUMBIA, APRIL 1, 1960

Area	Occupation of Employed Population					
	Professional and technical	Managers and proprietors	Clerical workers	Sales workers	Craftsmen and foremen	Operatives
Total	49,300	20,371	86,998	14,361	24,069	29,530
Area I	8,282	3,786	6,893	1,545	983	438
Area II*	8,399	4,319	7,411	1,994	934	478
Area III*	4,036	1,817	7,640	1,612	2,096	1,924
Area IV	3,573	1,216	7,570	1,051	1,942	2,668
Area V	1,354	261	2,814	338	939	1,724
Area VI	3,455	1,407	6,763	691	1,500	2,049
Area VII	549	314	1,502	366	1,011	2,255
Area VIII	4,522	1,718	7,627	911	862	786
Area IX*	1,165	579	2,865	529	1,062	1,048
Area X	643	258	1,882	325	1,147	2,002
Area XI	1,955	840	6,391	916	1,886	1,390
Area XII	2,553	1,016	6,516	1,058	2,442	1,979
Area XIII	1,474	542	4,304	706	1,669	1,589
Area XIV	1,165	265	3,821	280	988	2,127
Area XV	786	369	3,167	483	1,634	3,149
Area XVI	1,070	441	3,871	523	1,421	2,559
Area XVII	1,992	1,208	5,939	1,033	1,542	1,361
Institutional tract	328	15	22	-	11	4

*Areas used in this study.

TABLE XVIII

OCCUPATION OF EMPLOYED POPULATION: STATISTICAL AREAS, DISTRICT OF COLUMBIA, APRIL 1, 1960 (continued)

Area	Occupation of Employed Population			
	Private household workers	Service workers	Laborers	Not reported
Total	17,748	46,154	17,140	35,892
Area I	1,112	996	119	2,489
Area II	816	808	122	1,621
Area III	798	3,061	748	2,447
Area IV	2,150	5,064	1,492	3,333
Area V	1,035	2,747	916	1,423
Area VI	2,383	4,713	1,633	4,522
Area VII	2,221	3,986	2,267	2,927
Area VIII	646	1,945	427	3,681
Area IX	386	1,790	866	1,949
Area X	927	2,460	1,419	1,343
Area XI	132	1,149	176	614
Area XII	490	2,374	764	1,468
Area XIII	442	2,246	759	1,351
Area XIV	897	2,983	1,315	1,804
Area XV	1,834	4,560	2,284	2,479
Area XVI	1,112	3,353	1,326	1,336
Area XVII	367	1,879	507	1,068
Institutional tract	-	40	-	37

TABLE XIX

PERCENT DISTRIBUTION OF OCCUPATION OF EMPLOYED POPULATION: STATISTICAL AREAS, DISTRICT OF COLUMBIA, APRIL 1, 1960

Area	Occupation of Employed Population			
	Professional and technical	Managers and proprietors	Clerical workers	Sales workers
Total	14.4	6.0	25.5	4.2
Area I*	31.1	14.2	25.9	5.8
Area II*	31.2	16.1	27.5	7.4
Area III	15.4	6.9	29.2	6.2
Area IV	11.9	4.0	25.2	3.5
Area V	10.0	1.9	20.8	2.5
Area VI	11.9	4.8	23.2	2.4
Area VII	3.2	1.8	8.6	2.1
Area VIII	19.6	7.4	33.0	3.9
Area IX*	9.5	4.7	23.4	4.3
Area X	5.2	2.1	15.2	2.6
Area XI	12.7	5.4	41.4	5.9
Area XII	12.4	4.9	31.5	5.1
Area XIII	9.8	3.6	28.5	4.7
Area XIV	7.5	1.7	24.4	1.8
Area XV	3.8	1.8	15.3	2.3
Area XVI	6.3	2.6	22.8	3.1
Area XVII	21.1	6.4	31.4	5.5
Institutional tract	71.8	3.3	4.8	0

*Areas used in this study.

TABLE XIX

PERCENT DISTRIBUTION OF OCCUPATION OF EMPLOYED POPULATION: STATISTICAL AREAS, DISTRICT OF COLUMBIA, APRIL 1, 1960
(continued)

Area	Occupation of Employed Population					
	Craftsmen and foremen	Operatives	Private household workers	Service workers	Laborers	Not reported
Total	7.0	8.7	5.2	13.5	5.0	10.5
Area I	3.7	1.6	4.2	3.7	0.5	9.3
Area II	3.5	1.8	3.0	3.0	0.5	6.0
Area III	8.0	7.4	3.0	11.7	2.9	9.3
Area IV	6.5	8.9	7.1	16.8	5.0	11.1
Area V	6.9	12.7	7.6	20.3	6.8	10.5
Area VI	5.2	7.0	8.2	16.2	5.6	15.5
Area VII	5.8	13.0	12.8	22.9	13.0	16.8
Area VIII	3.7	3.4	2.8	8.4	1.9	15.9
Area IX	8.7	8.6	3.2	14.6	7.1	15.9
Area X	9.3	16.1	7.5	19.8	11.4	10.8
Area XI	12.2	9.0	0.9	7.4	1.1	4.0
Area XII	11.8	9.6	2.4	11.5	3.7	7.1
Area XIII	11.1	10.5	2.9	14.9	5.0	9.0
Area XIV	6.3	13.6	5.7	19.1	8.4	11.5
Area XV	7.9	15.2	8.8	22.0	11.0	11.9
Area XVI	8.3	15.0	6.5	19.7	7.8	7.9
Area XVII	8.2	7.2	1.9	9.9	2.7	5.7
Institutional tract	2.4	0.9	0	8.7	0	8.1

APPENDIX E

SAMPLE SHEET OF SOCIO-ECONOMIC DATA COLLECTED

OCCUPATIONS OF MAJOR WAGE EARNERS IN FAMILIES OF CHILDREN PARTICIPATING IN THIS STUDY

Major Wage Earners in Families of Culturally Advantaged Children:

Foreign Service, Department of Commerce
Store Manager
Editor, U.S.I.A.
Assistant Professor, The American University
Convention Director, National Association Home Builders
Psychiatrist, Department of Public Health
Mechanical Engineer
Minister, Herald of Deliverance, Inc.
Certified Public Accountant
Professor of Physical Chemistry
Manager, Advertising Department, Army Times Publishing Co.
Writer
Teacher, Roosevelt High School
Physicist, Professor of Physics
Diplomat, Department of State
Government Analyst, Fort Meade
Translator, Writer, U.S.I.A. (V.C.A.)
Lawyer, Self-employed
Engineer
Director of Suburban Stores, J. Garfinckel and Co.
Physician
Physician
Psychiatrist
Physician
Economist
Store Manager
Administrator, Department of Vocational Rehabilitation
Foreign Service Office, State Department
Economist, Department of Labor
City Planner, Robert Nathan Associates
Builder
Consultant, Defense Department
Public Affairs Officer, Naval Research Laboratory
Air Force Officer

News Editor, N.B.C.
Attorney, Veterans Administration
Clergyman
Banker, Vice President of Bank
Optometrist
Digital Computer-Programmer, U.S.A.F.
Audiologist, Gallaudet College
Administrator, W.T.O.P. Radio
Mathematician
Economist, World Bank
Journalist
Ecologist

Major Wage Earners in Families of Culturally Deprived Children:

Mother, Day Work, Pepco
Mother, Day Work
Mother, Day Work
Mother, Day Work
Public Assistant
Janitor
Mother, Day Work
Public Assistant
Public Assistant
Laborer
Repairman, U.S. Post Office
Laborer
Mother, Salad Girl, Madison Hotel
Porter
Truck Driver
Laborer
Truck Helper
Laborer
Messenger, Florist
Parking Lot Attendant
Fur Glazer
Mother, Maid
Cement Finisher
Public Assistant
Boxmaker
Truck Driver
Mother, Day Work
Porter
Helper, Furniture Company
Truck Driver
Roofer
Rigger

Clerk
Public Assistant
Laborer
Porter
Mother, Counter Girl
Guard
Janitor
Navy
Presser
Mechanic
Auto Painter
Public Assistant
Construction Worker
Public Assistant
D.C. Sanitation Department
Plasterer
Launderer
Maintenance Man

APPENDIX F

DESCRIPTION OF OCCUPATIONS
REPORTED IN U.S. CENSUS

Professional and technical -- engineers; medical and other health workers; elementary and secondary school teachers; other instructors and professors; actors, architects, artists, authors, clergymen, lawyers, librarians, musicians, reporters, surveyors, physical science technicians, and kindred workers.

Managers and proprietors -- farmers and fare managers; buyers, building managers and superintendents, society and union officials, postmasters, purchasing agents, railroad conductors, ship officers, pilots, pursers, and engineers.

Clerical workers -- secretaries, stenographers, and typists; baggagemen, bank tellers, bill collectors, bookkeepers, cashiers, dispatchers, messengers, file clerks, library attendants, mail carriers, postal clerks, office machine operators, receptionists, stock clerks, storekeepers, telephone operators, and kindred workers.

Sales workers -- advertising agents and salesmen, auctioneers, demonstrators, insurance agents and brokers, insurance underwriters, newsboys, peddlers, real estate agents and brokers, stock and bond salesmen, and sales clerks in retail trade.

Craftsmen and foremen -- construction craftsmen (including brick-masons, carpenters, electricians, excatating and grading machinery operators, painters, paperhangers, pipe-fitters, plumbers, roofers, stone masons, and the like); mechanics and repairmen; metal craftsmen (including blacksmiths, boilermakers, coppersmiths, die makers and setters forgemen, machinists, millwrights, sheet metal workers, toolmakers, etc.); other craftsmen (including bakers, bookbinders, compositors, cranemen and derrickmen, engravers, furriers, jewelers, locomotive engineers and firemen, millers, piano tuners, printing pressmen, shoemakers, gold- and silversmiths, stone cutters, tailors, telegraph and telephone linemen and servicemen, typesetters, upholsterers, and window dressers).

Operatives -- drivers and deliverymen; apprentices, assemblers, auto service and parking attendants, boatmen, bus conductors, dressmakers, laundry and dry cleaning operatives, meat cutters, milliners, mine operatives and laborers, motormen, power station operators, railroad brakemen and switchmen, sailors, etc.

Private household workers -- babysitters, housekeepers, cooks and laundresses in private households.

Service workers -- excluding private household; includes protective service workers (detectives, firemen, guards, marshals, policemen, watchmen), waiters, cooks, and bartenders, ushers in amusement places, barbers, bootblacks, boarding and lodginghouse keepers, chambermaids, charwomen, elevator operators, hairdressers, stewards, janitors, restaurant workers, midwives, practical nurses, and sextons.

Laborers -- farm laborers and farm foremen; laborers not on farms or in mines (carpenters' helpers, car washers, fishermen, garage laborers, gardeners, longshoremen, lumbermen, teamsters, warehousemen, etc.).

APPENDIX G

LETTERS GIVING AUTHORIZATION TO USE TESTS AND TO CONDUCT RESEARCH IN DISTRICT OF COLUMBIA ELEMENTARY SCHOOLS

GEORGE PEABODY COLLEGE *for* TEACHERS

Divisions The Graduate School, The College, The Peabody Demonstration School, Survey and Field Services

NASHVILLE 5, TENNESSEE

March 11, 1966

Mrs. Anita O. Solomon
5463 Nebraska Avenue, NW
Washington, D. C. 20015

Dear Mrs. Solomon:

It was good to have your recent letter concerning the study you are conducting of disadvantaged children. For research purposes, you have my complete blessing to use the PPVT as you see fit. Of course, I would be very interested in an abstract of your investigation upon its completion.

Sincerely yours,

L.M. Dunn

Lloyd M. Dunn, Ph.D.
Director, IMRID

LMD/lk

UNIVERSITY OF Minnesota

COLLEGE OF EDUCATION
DEPARTMENT OF EDUCATIONAL PSYCHOLOGY • MINNEAPOLIS, MINNESOTA 55455

August 8, 1965

Mrs. Anita O. Solomon
5463 Nebraska Avenue, NW
Washington, D. C.

Dear Mrs. Solomon:

I am glad to grant permission for you to use our tests of creative thinking in your dissertation study. I am assuming that you have copies of the booklets for reproduction and copies of the appropriate scoring manuals for evaluating responses. Right now when we are bending all our efforts to get ready a couple of alternate forms for commercial use, we are having difficulty supplying scoring guides for some of the tasks. Thus, if you do not have the scoring guides, it might be a good idea to check to see if we can dig up copies of the required manuals for the specific test tasks you plan to use.

Sincerely,

E. Paul Torrance

E. Paul Torrance
Professor

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF GENERAL RESEARCH, BUDGET, AND LEGISLATION
FRANKLIN ADMINISTRATION BUILDING
THIRTEENTH AND K STREETS, NW.
WASHINGTON, D C 20005

OFFICE OF THE
ASSISTANT SUPERINTENDENT

August 18, 1966

This is to confirm our approval of the research proposal of Mrs. Anita O. Solomon, whose grant application, number 6-8577 (A Comparative Analysis of Creative and Intelligent Behavior of the Elementary School Child of Different Socio-economic Background), has been submitted to the Department of Research, Budget, and Legislation, Department of Education, District of Columbia. Approval has also been given by Dr. Dorothy Johnson, Assistant Superintendent of Elementary Schools.

The population to be utilized in the study is 480 first, third, and fifth grade children from the District of Columbia public schools, representing a range of socio-economic levels. The study is to be conducted, as outlined by Mrs. Solomon, during the school year 1966-67, in the following elementary schools: Lafayette, Murch, Petworth, Simmons and Thompson. Principals in each of these schools have expressed special interest in this project and they have agreed to permit students to participate in the study.

Mrs. Solomon has agreed to maintain the confidential nature of information with respect to each particular individual in the study. Confidentiality of all records will be maintained and no one individual will be identified.

A report of the findings of this study will be presented to the Department of Research, Budget, and Legislation, Board of Education, prior to publication or submission to the U. S. Office of Education.

Mildred P. Cooper, Ph. D.
Assistant to the Assistant Superintendent
Department of Research, Budget and
Legislation

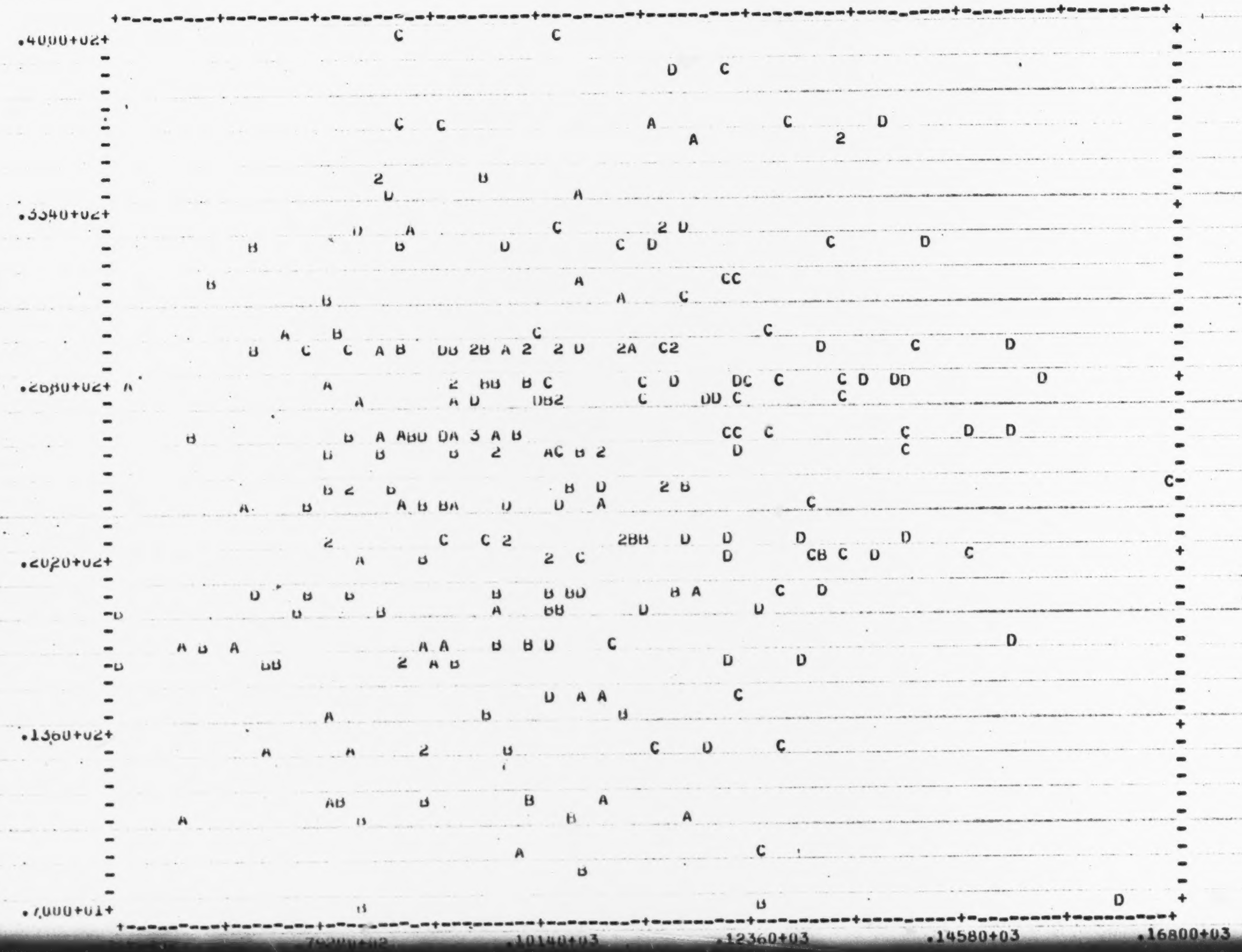
APPENDIX H

SCATTER DIAGRAMS FOR FIGURAL CREATIVITY, PPVT, SEX, AND SOCIO-ECONOMIC STATUS

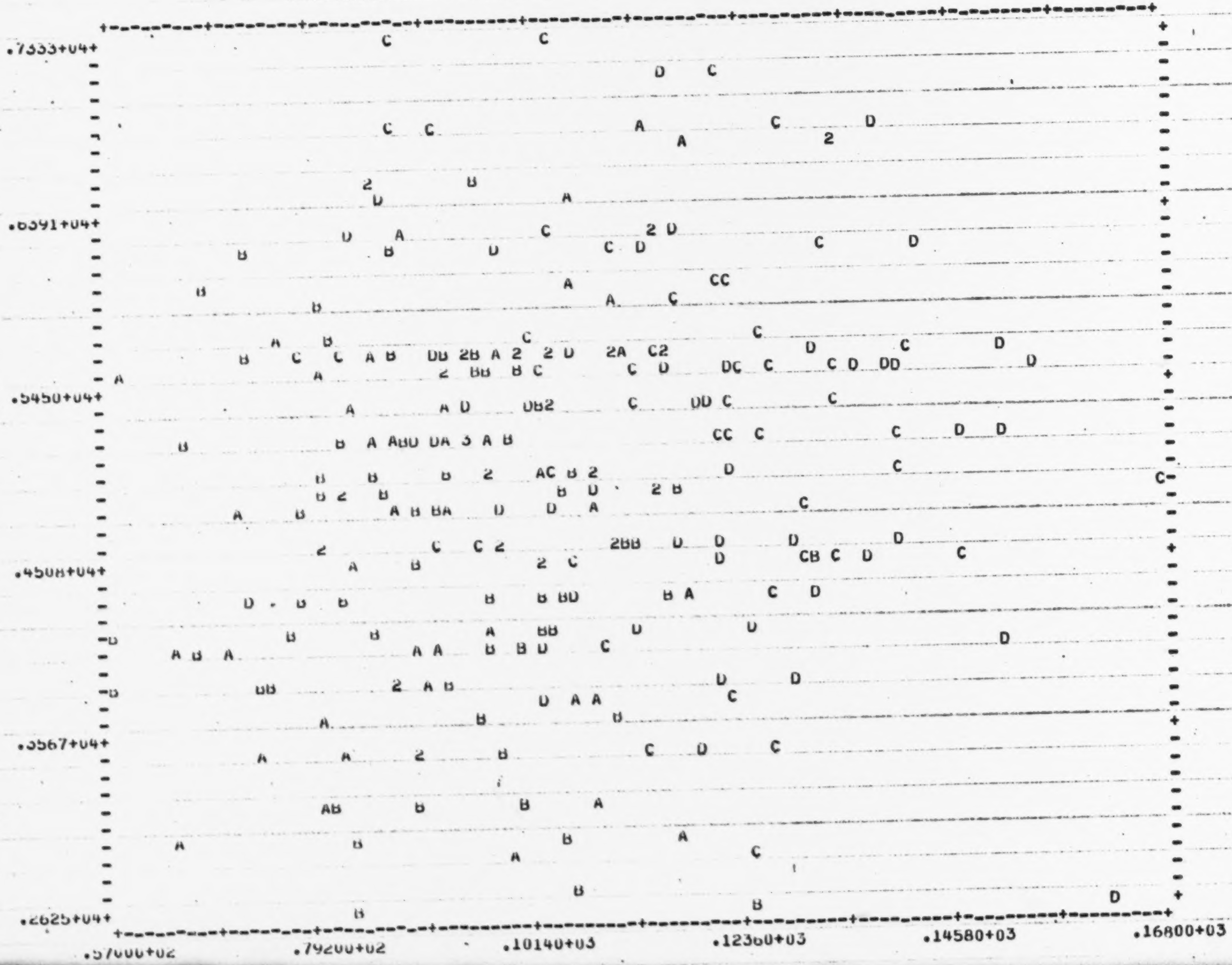
The symbols used in the scatter diagrams are as follows: A = female low socio-economic status; B = male low socio-economic status; C = female high socio-economic status; and D = male high socio-economic status.

FIGURAL FIRST GRADE

FLUENCY RAW SCORES



FIGURAL FIRST GRADE FLUENCY STANDARD SCORES



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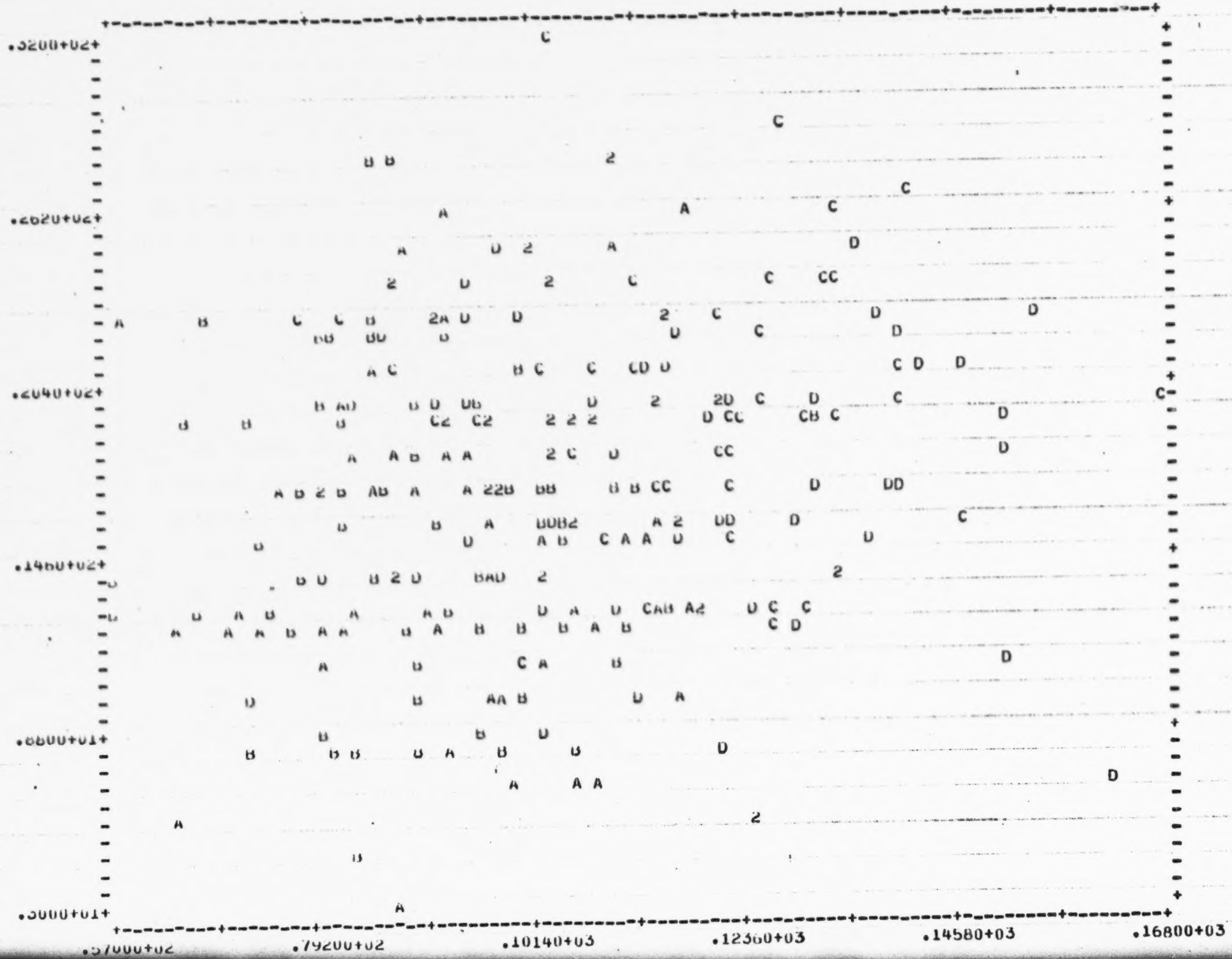
FIGURAL FIRST GRADE

FLEXIBILITY RAW SCORES



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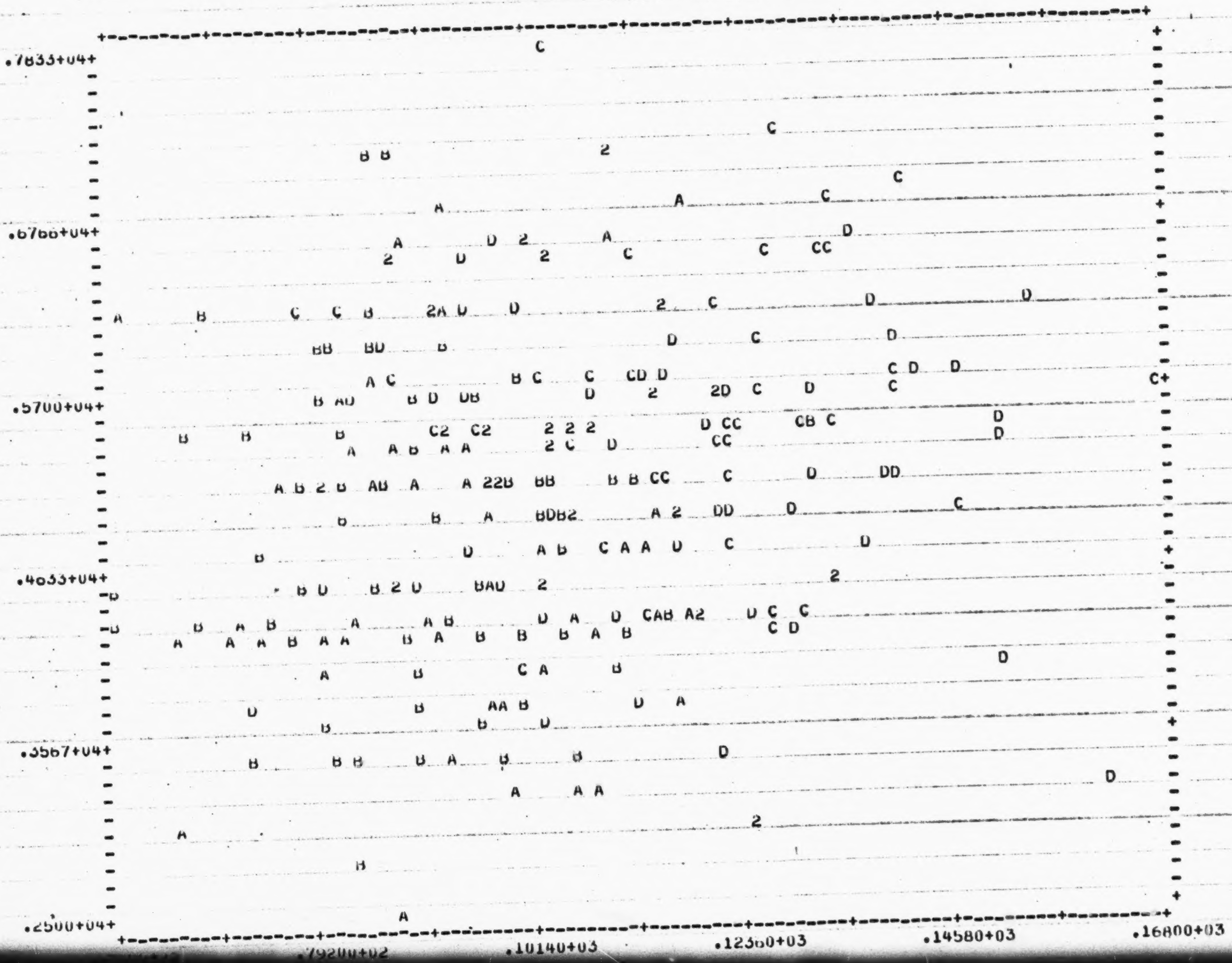

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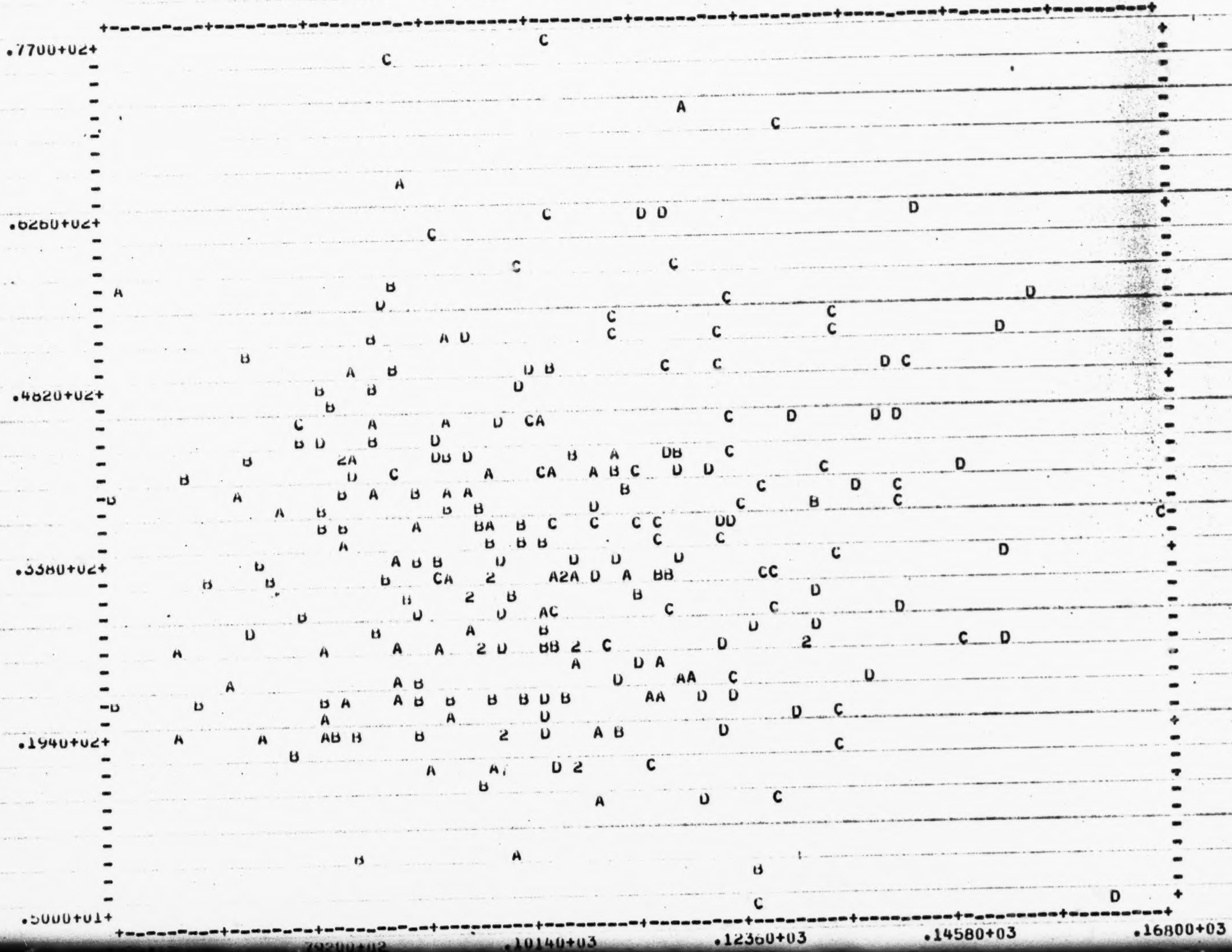

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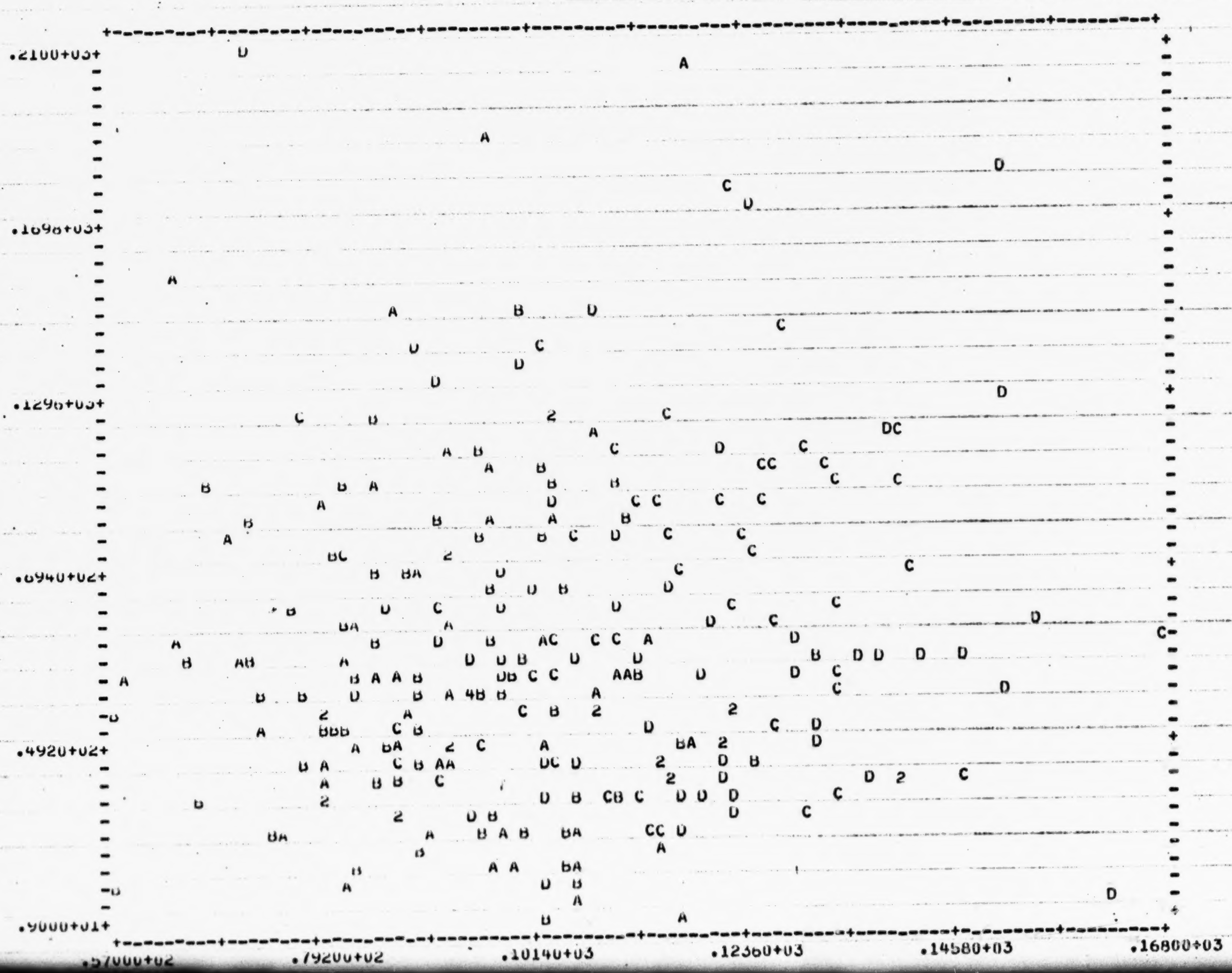

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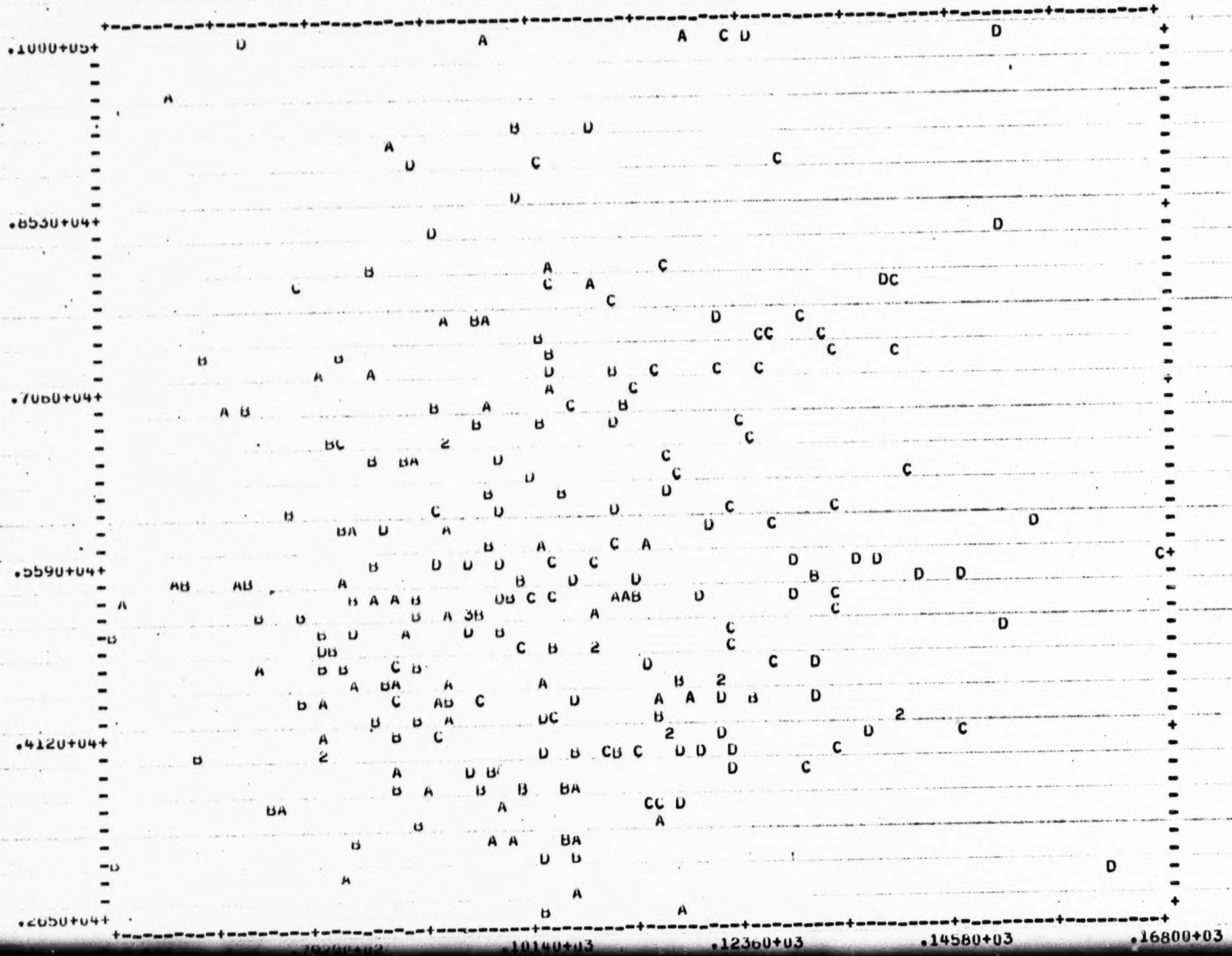

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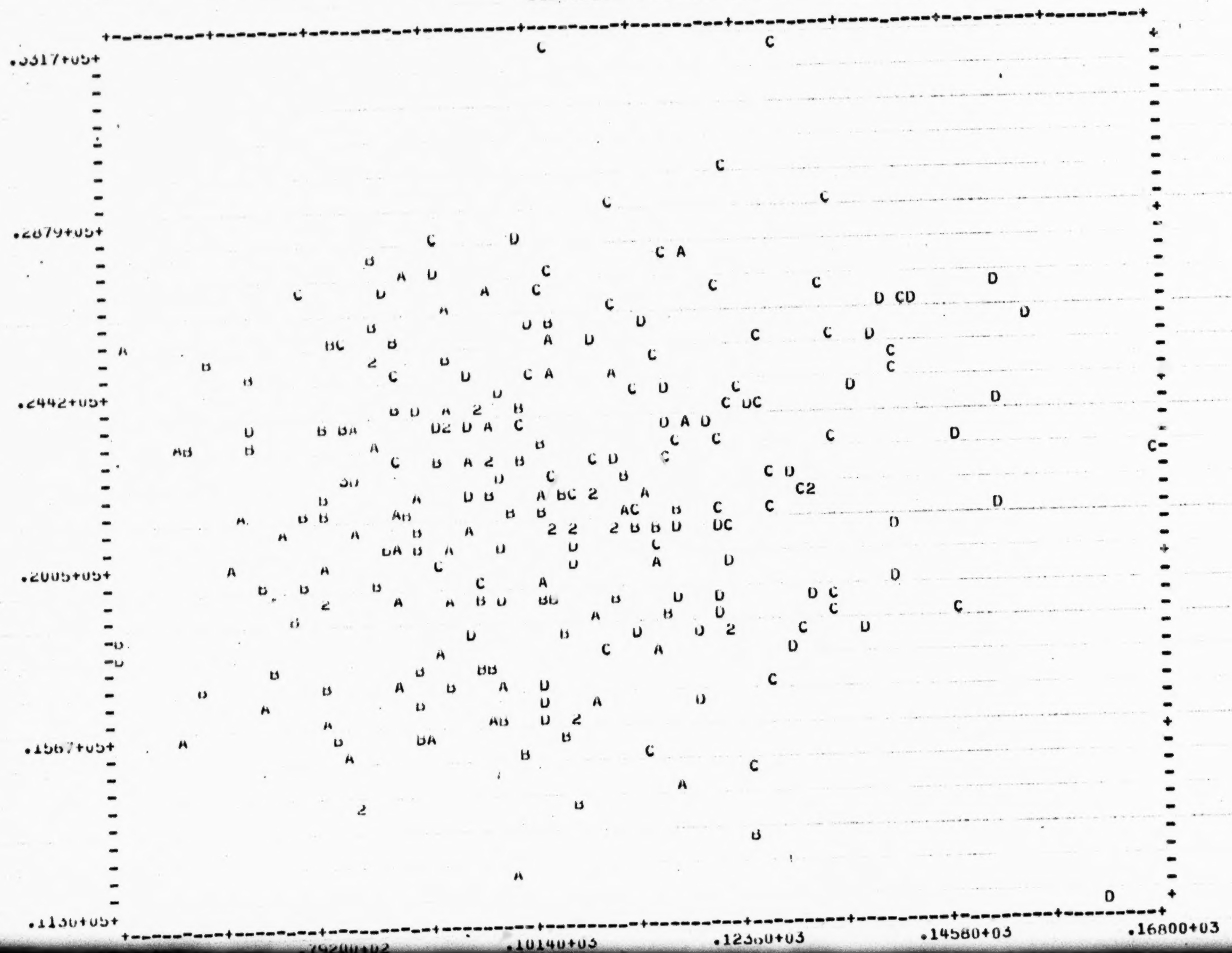
COMPOSITE STANDARD SCORES



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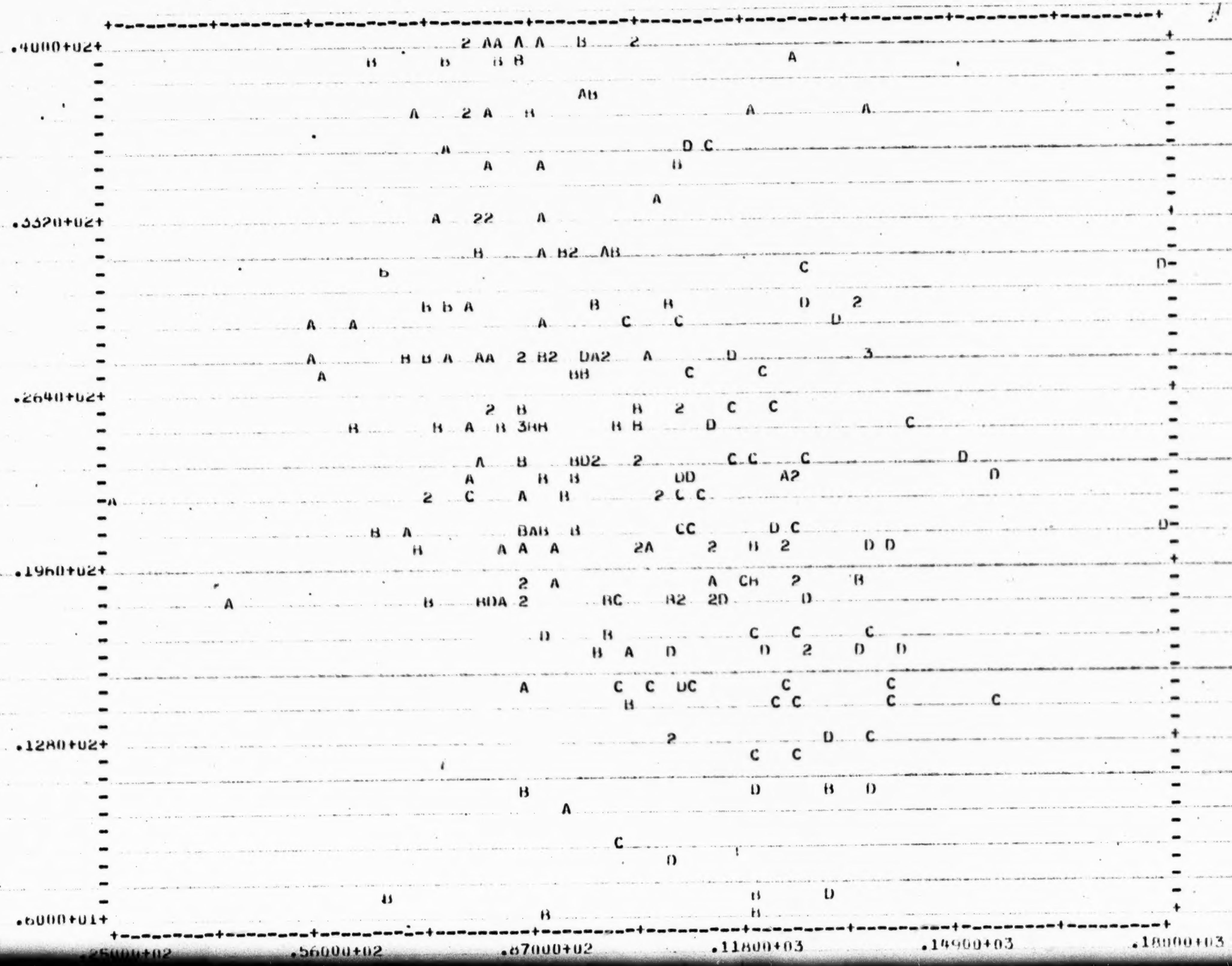

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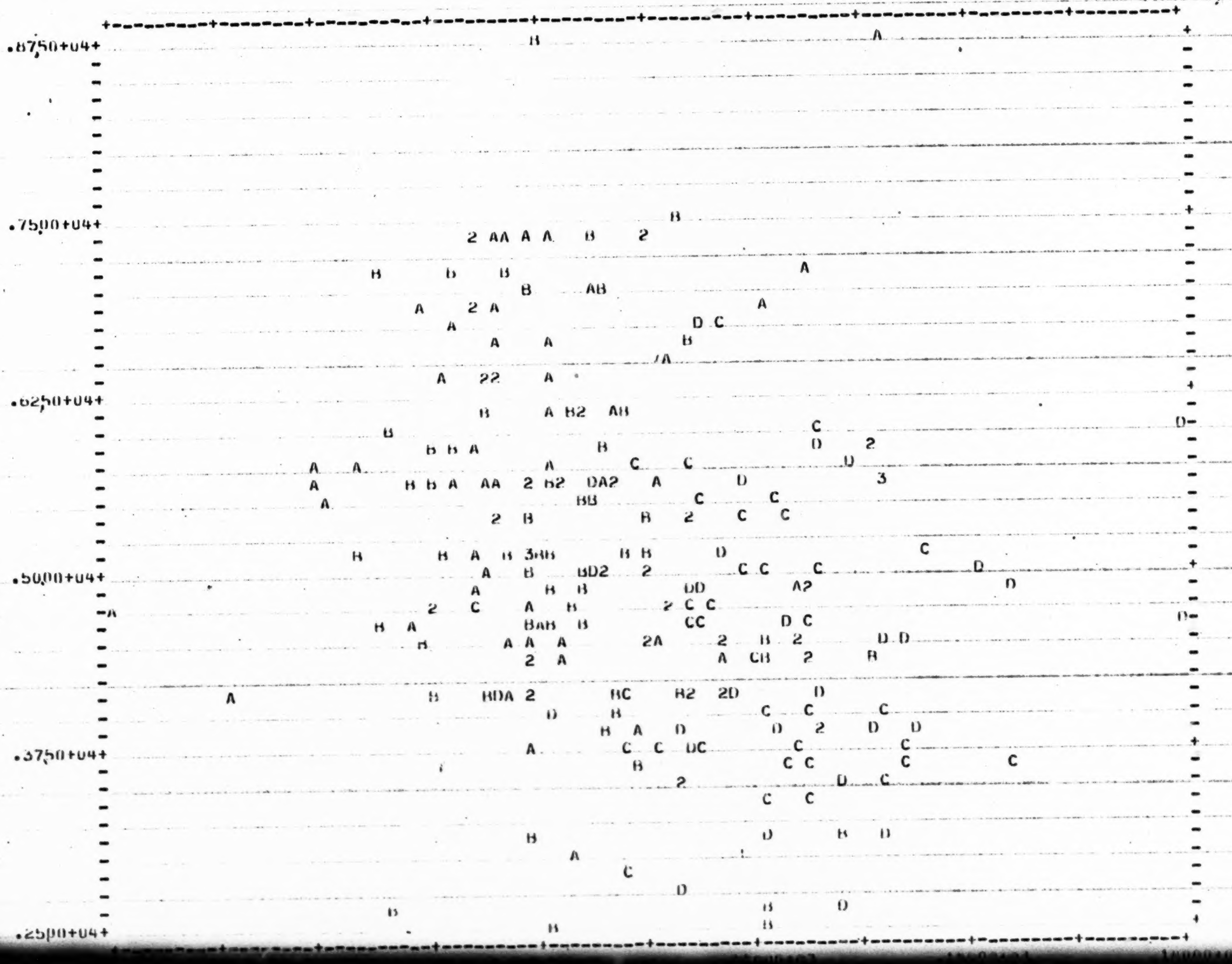

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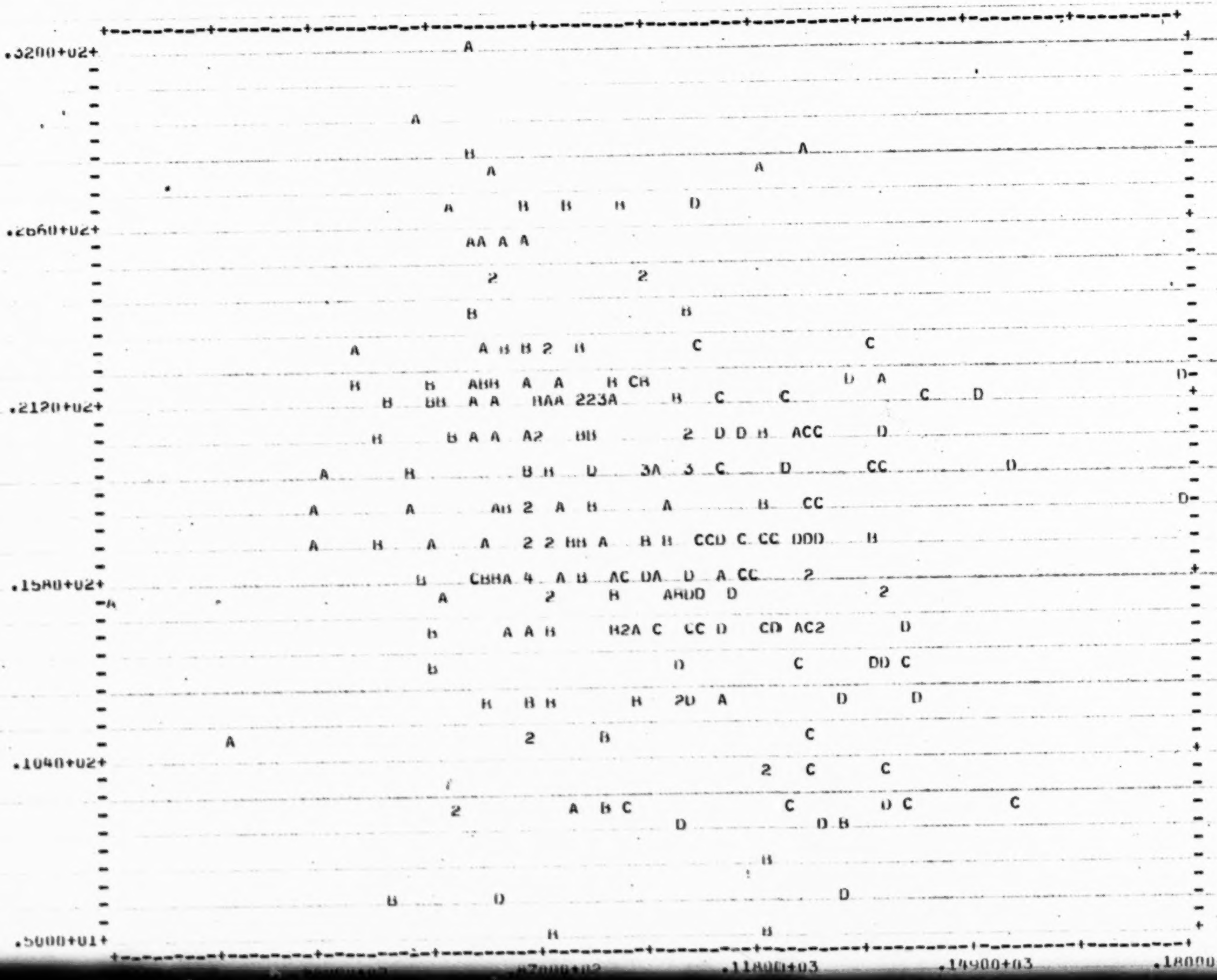

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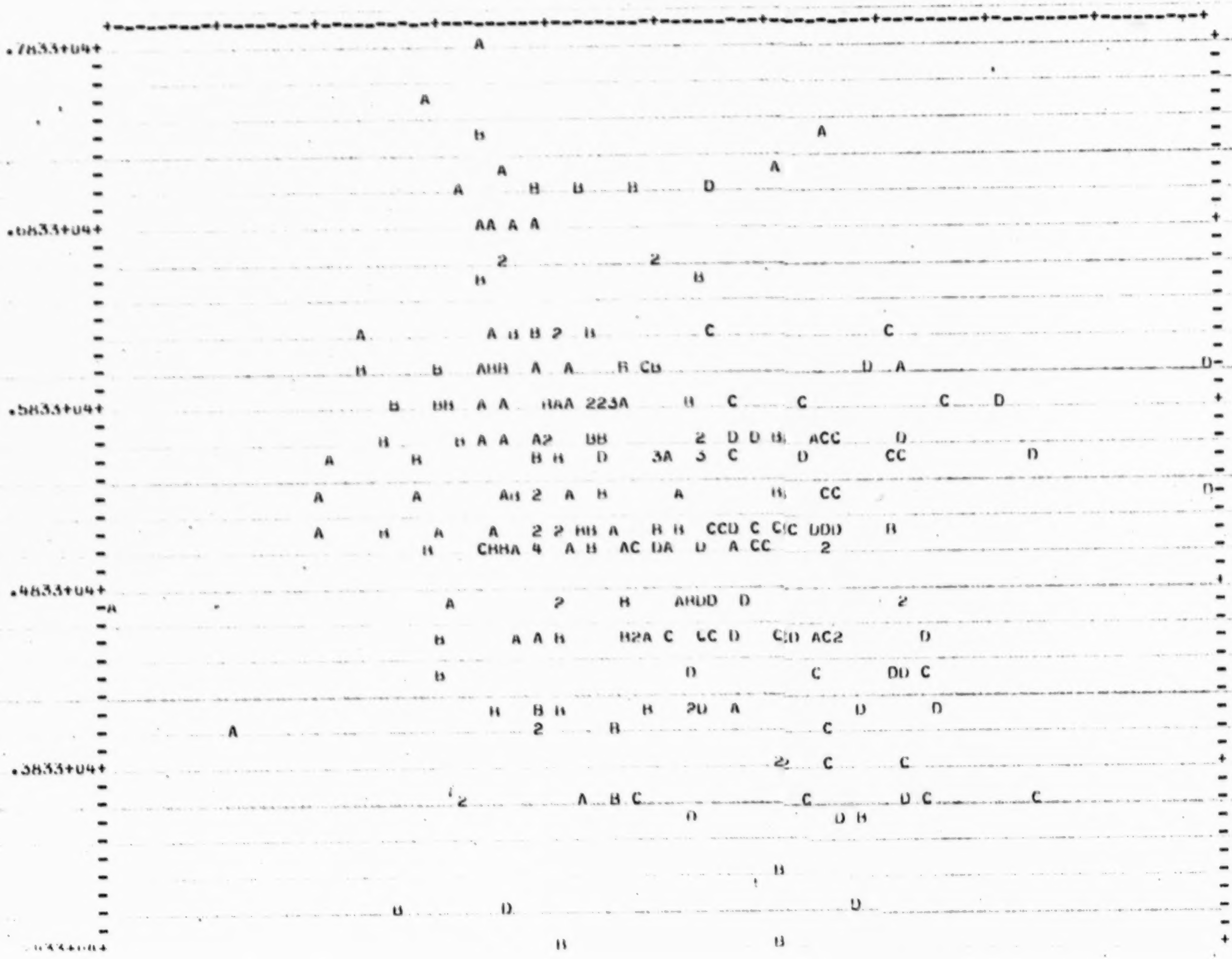

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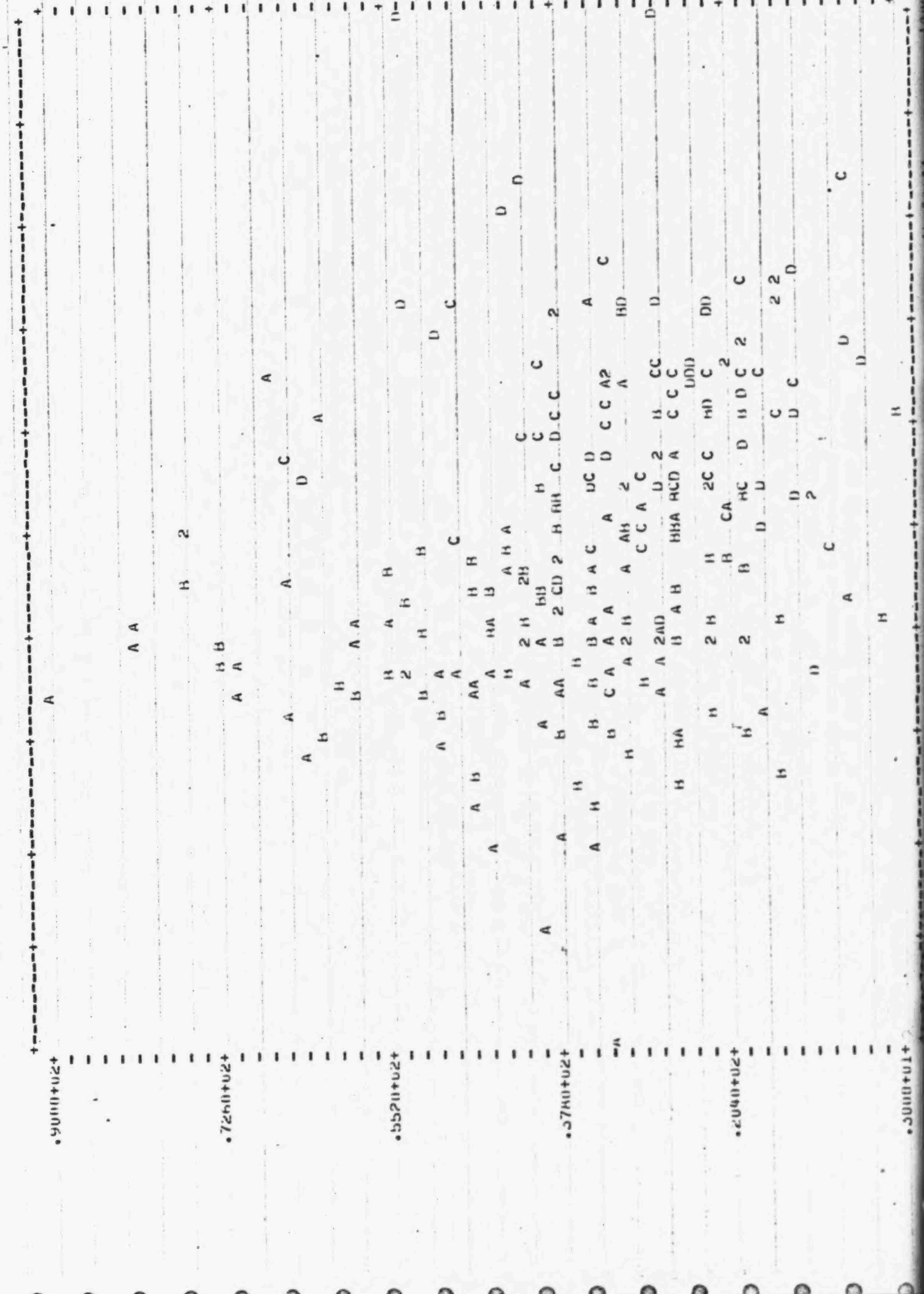

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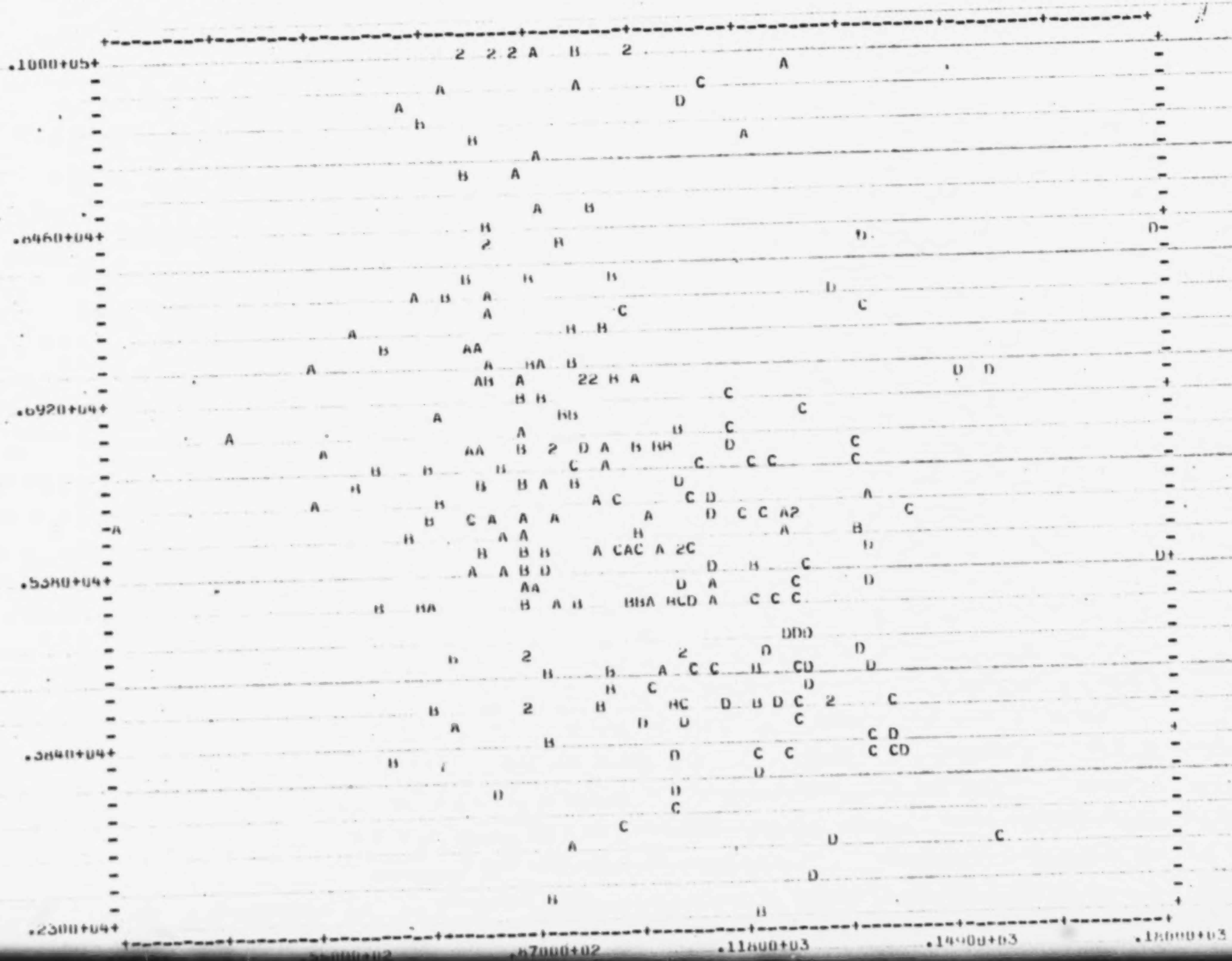

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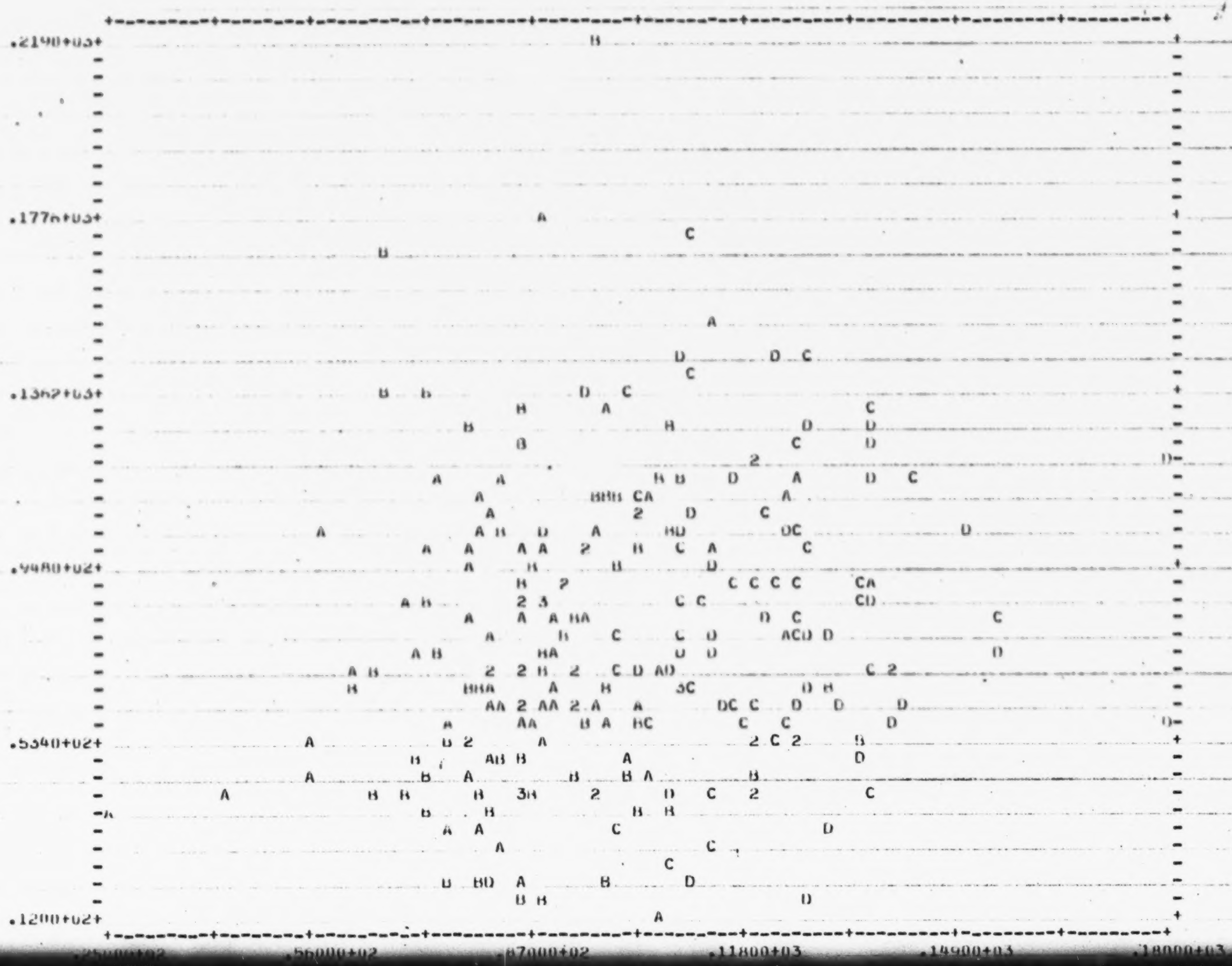

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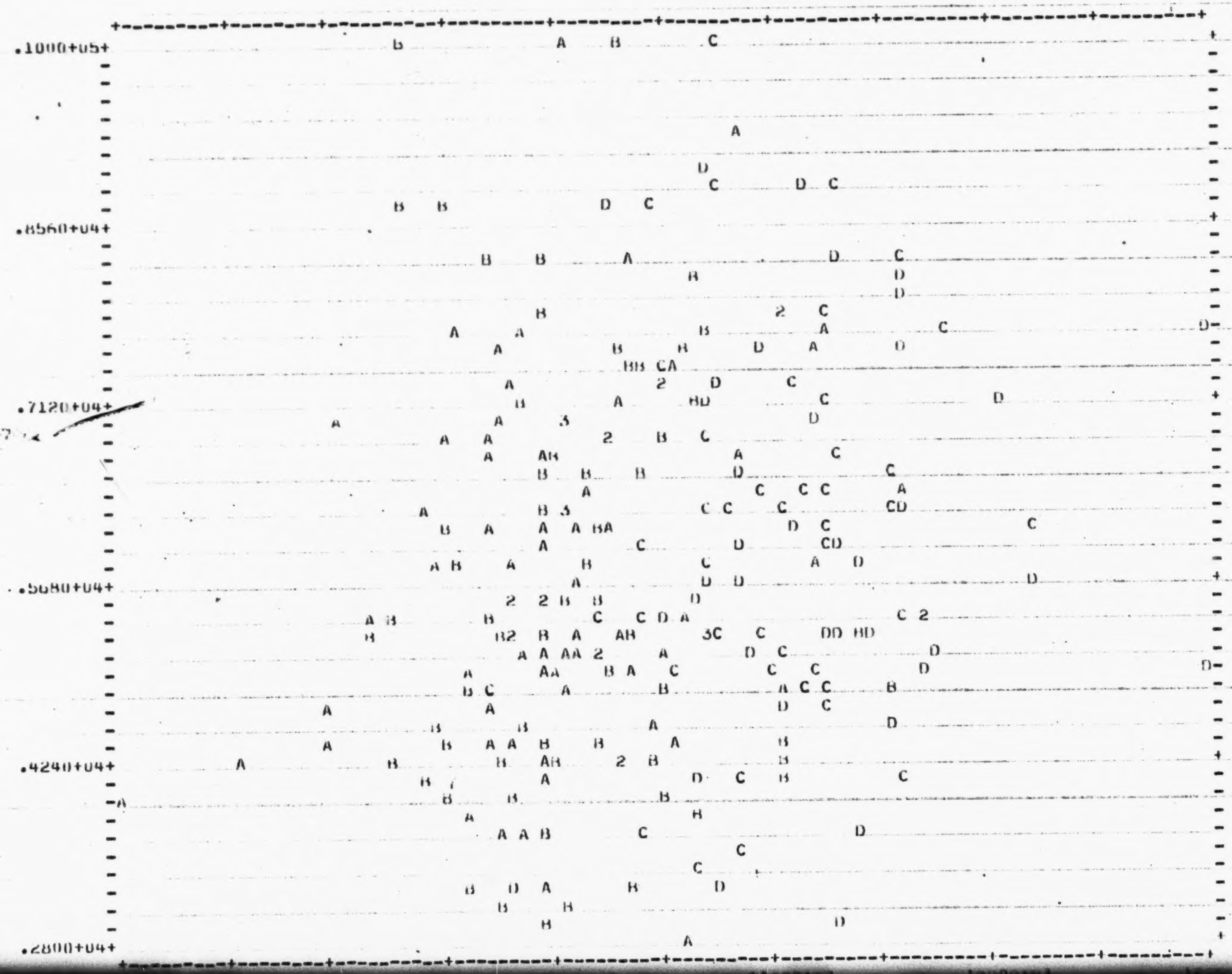

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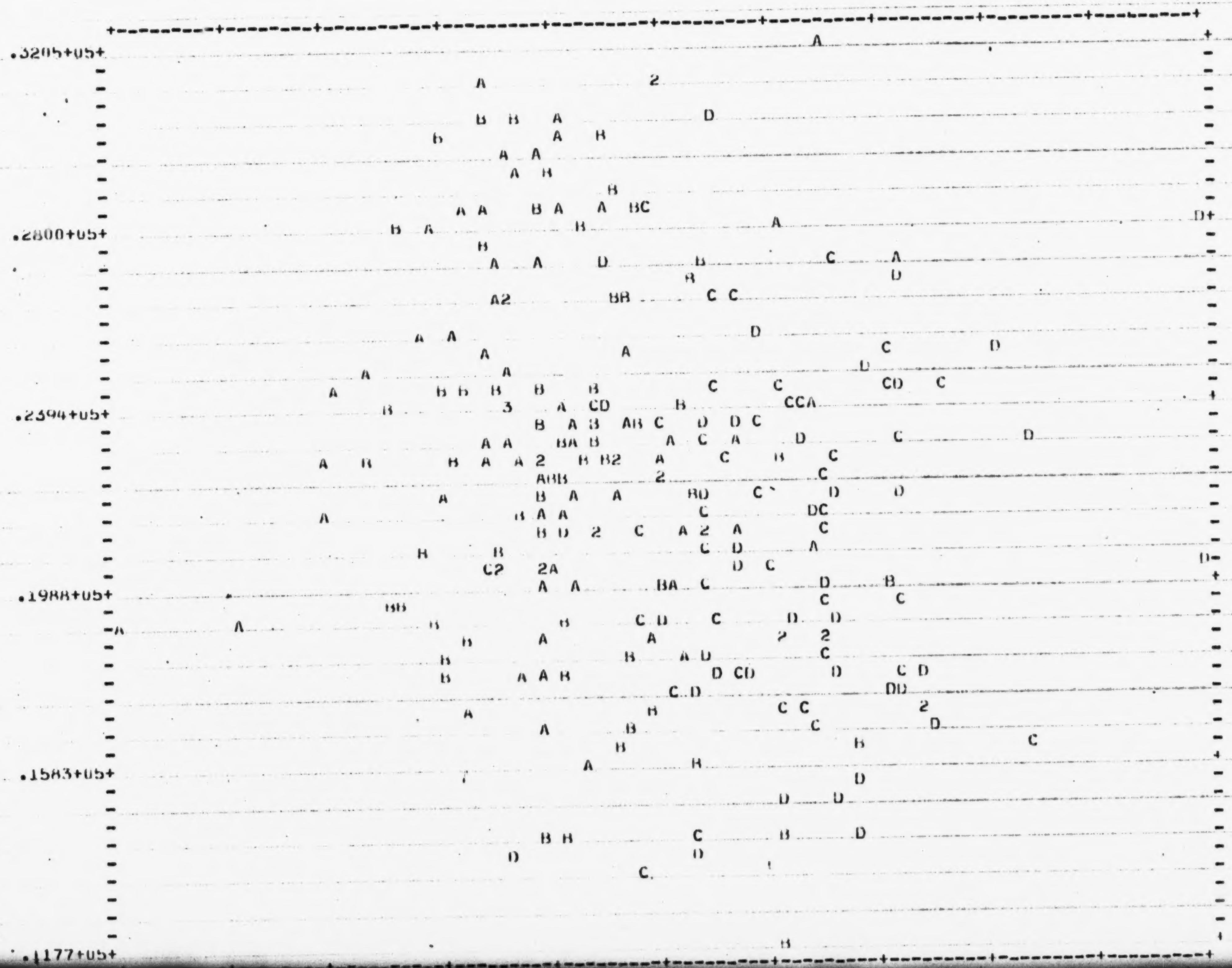

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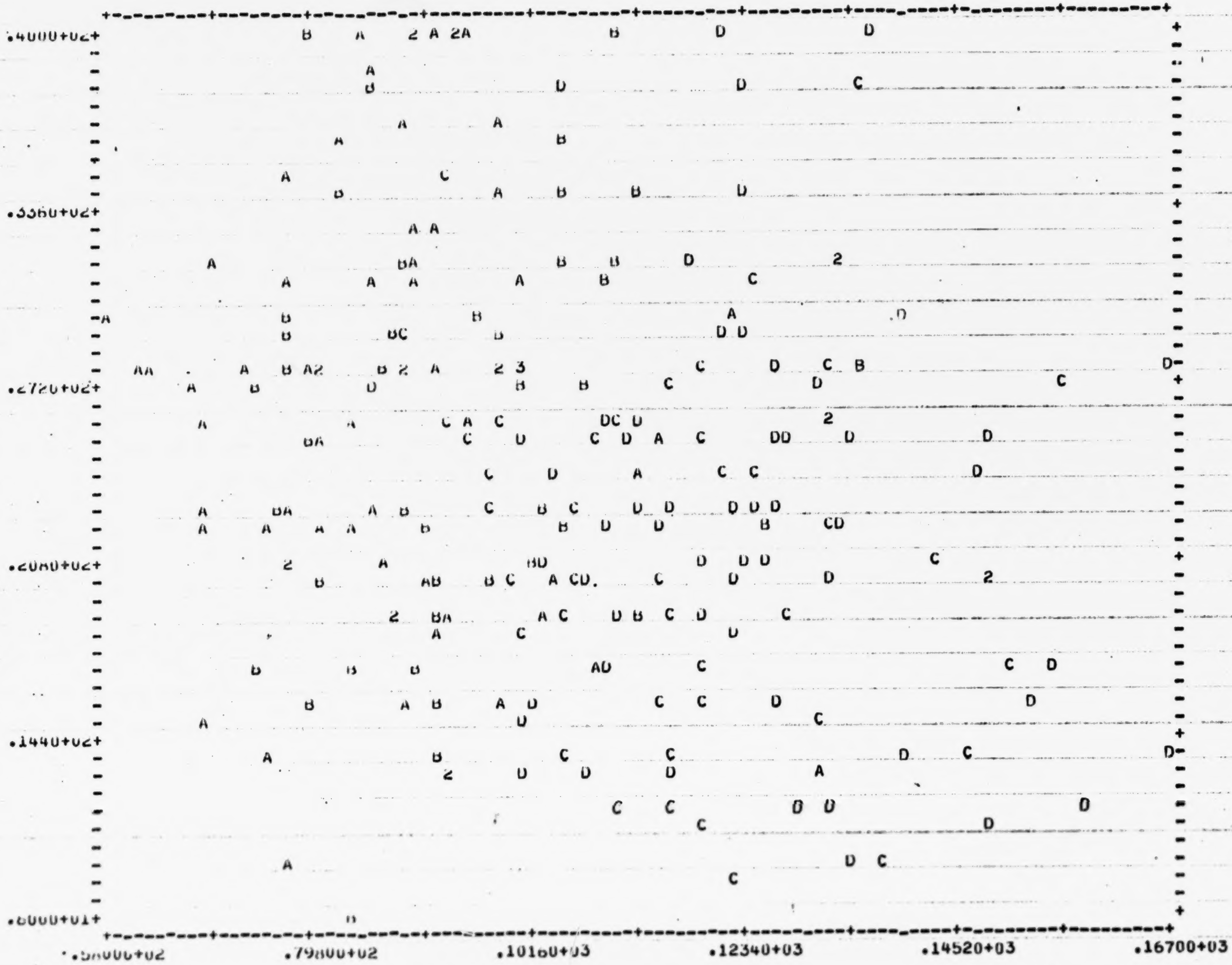

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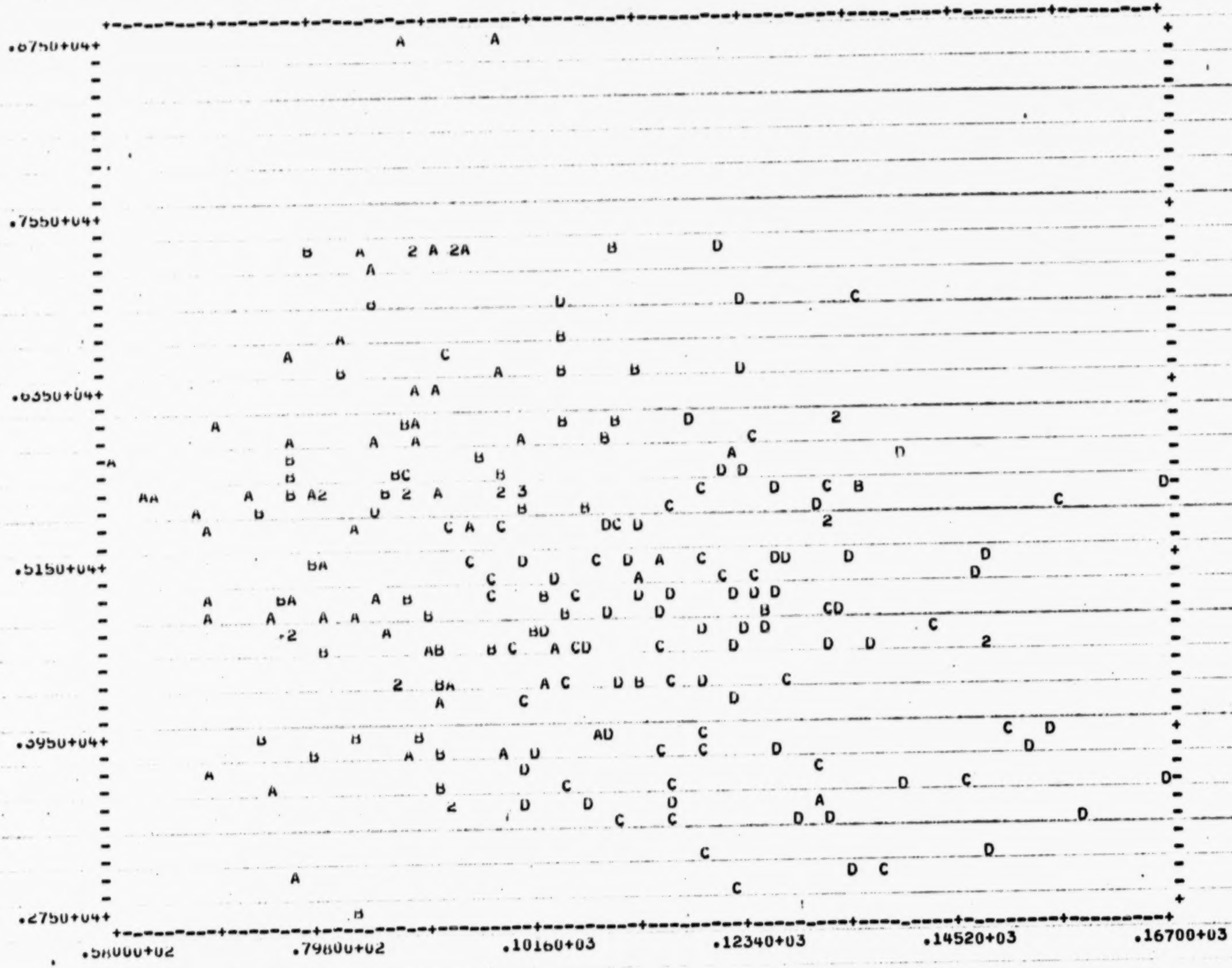

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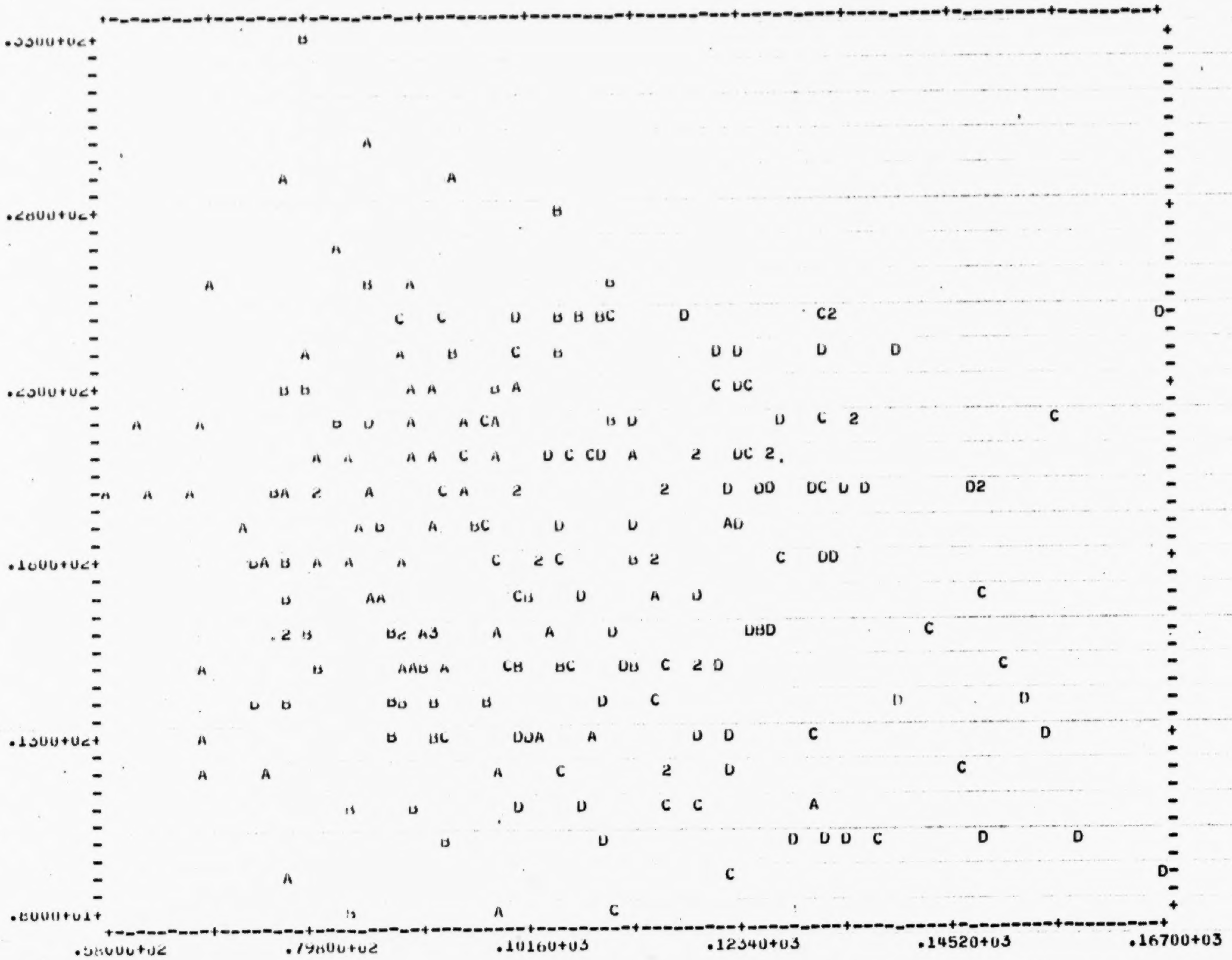

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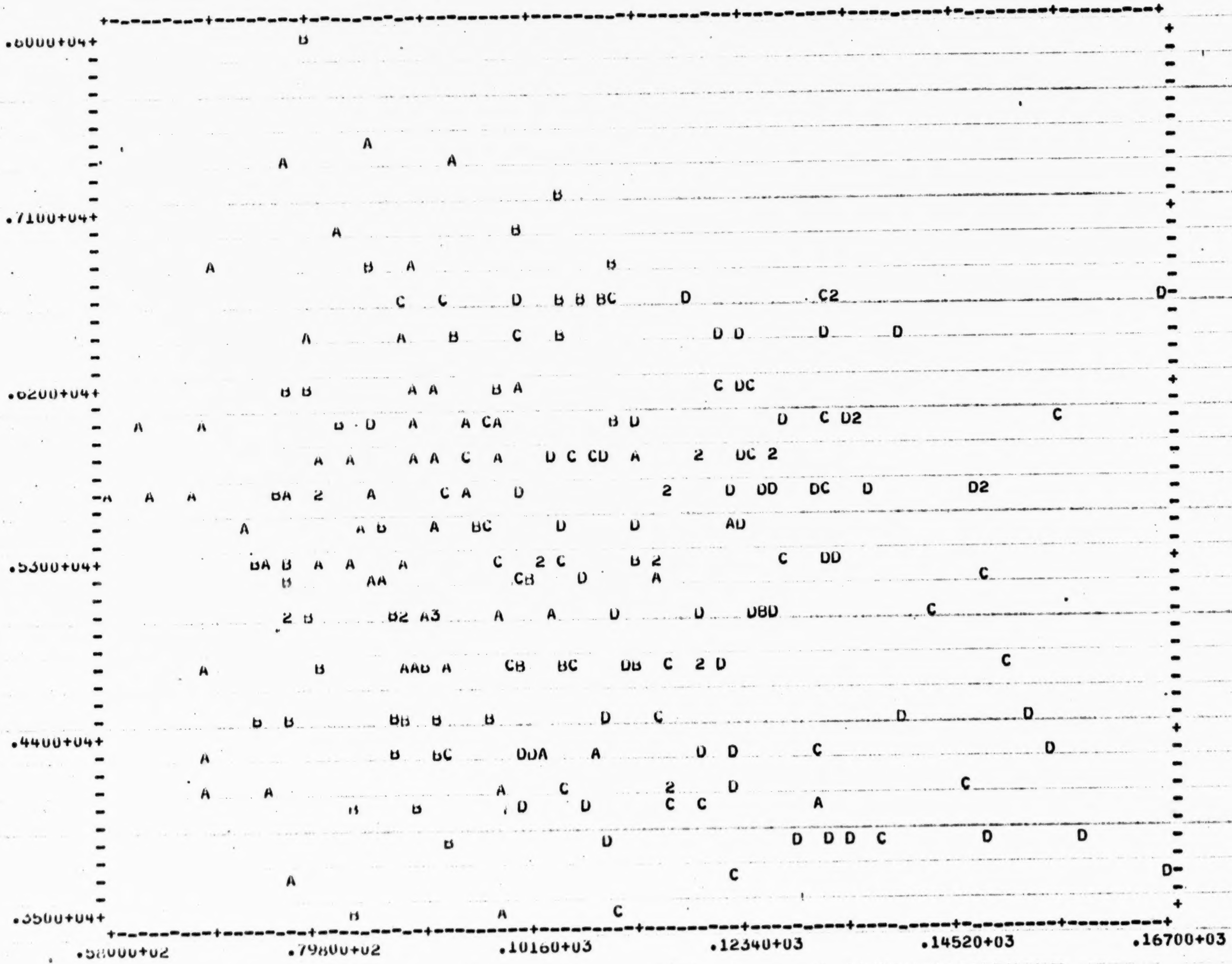

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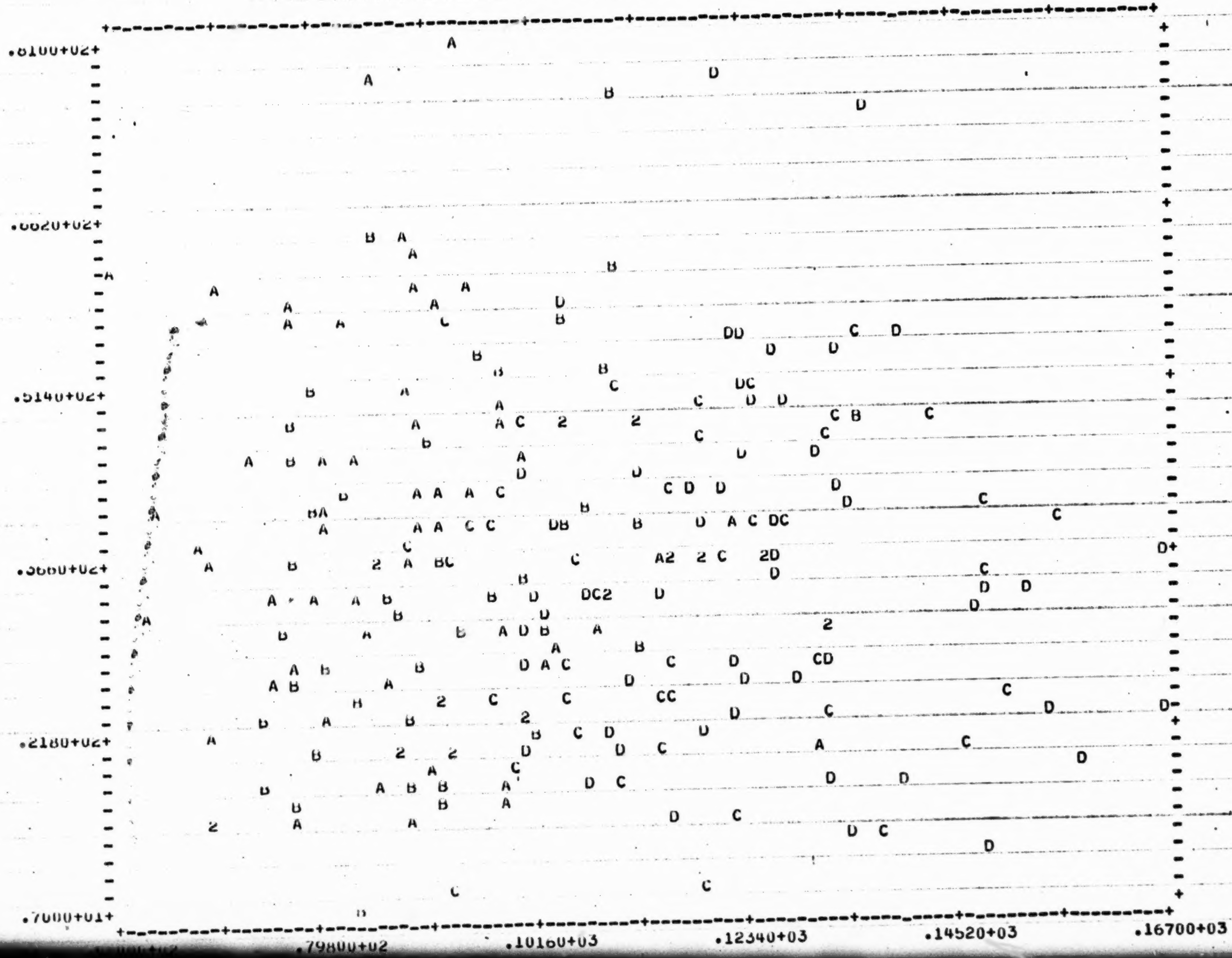

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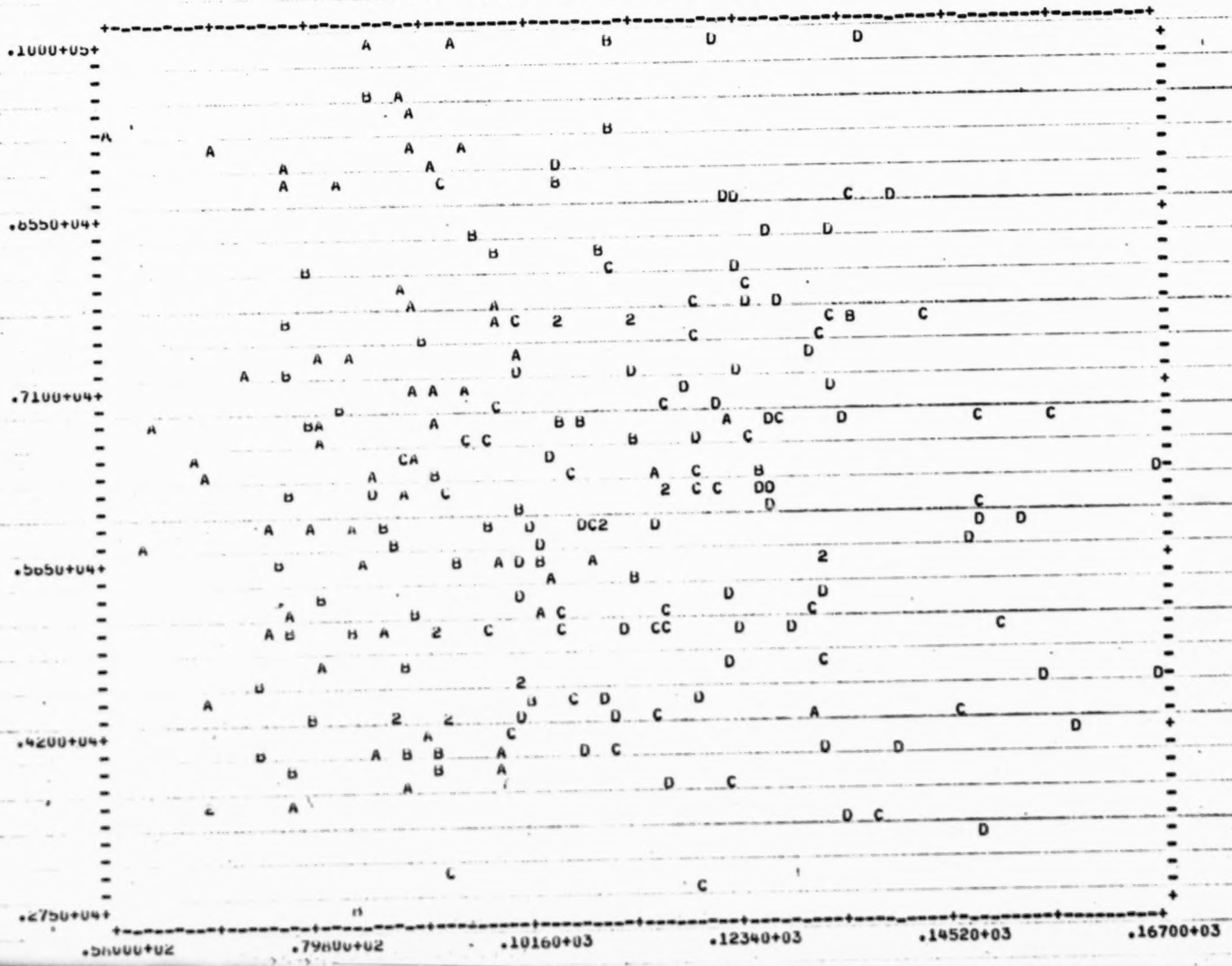

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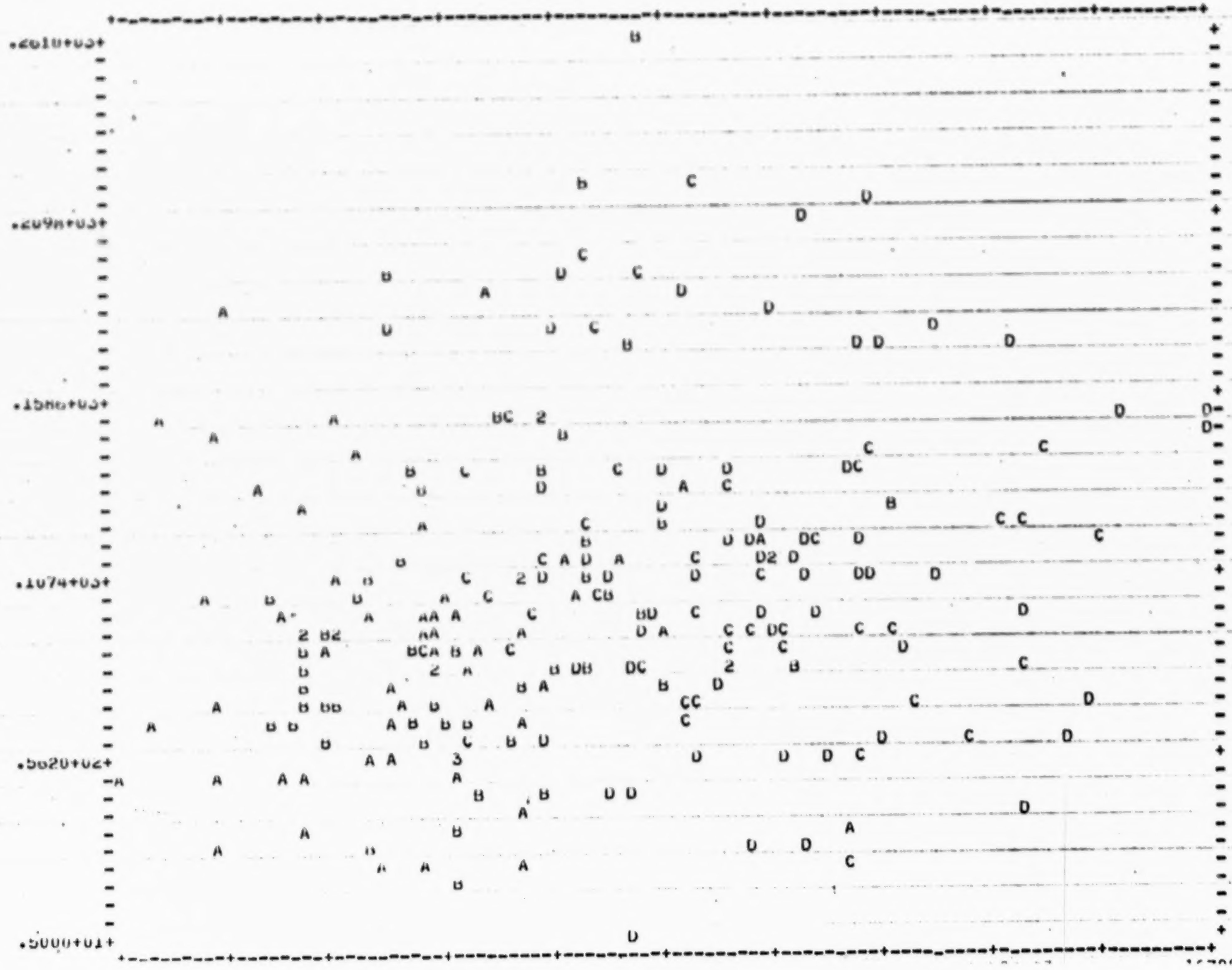

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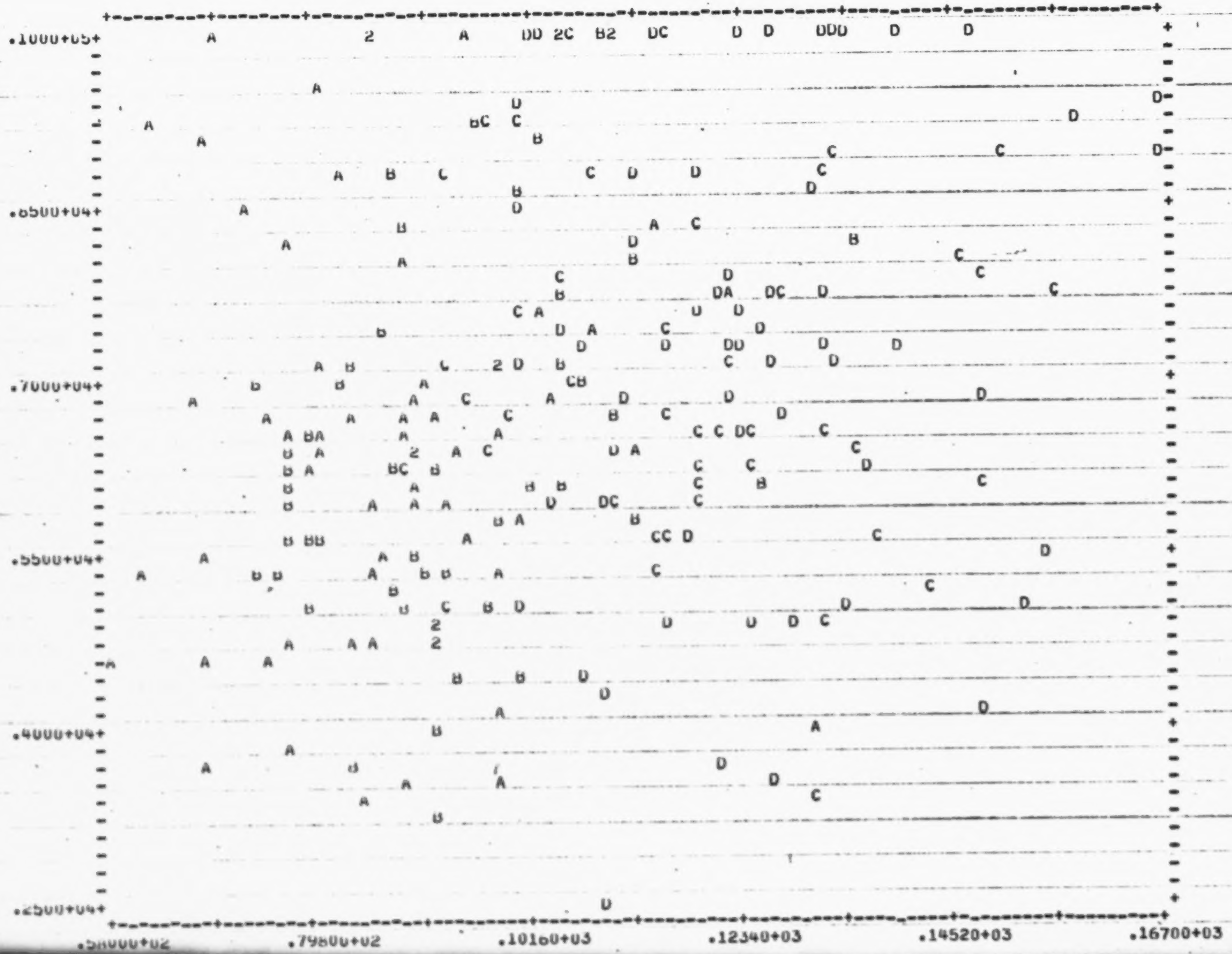

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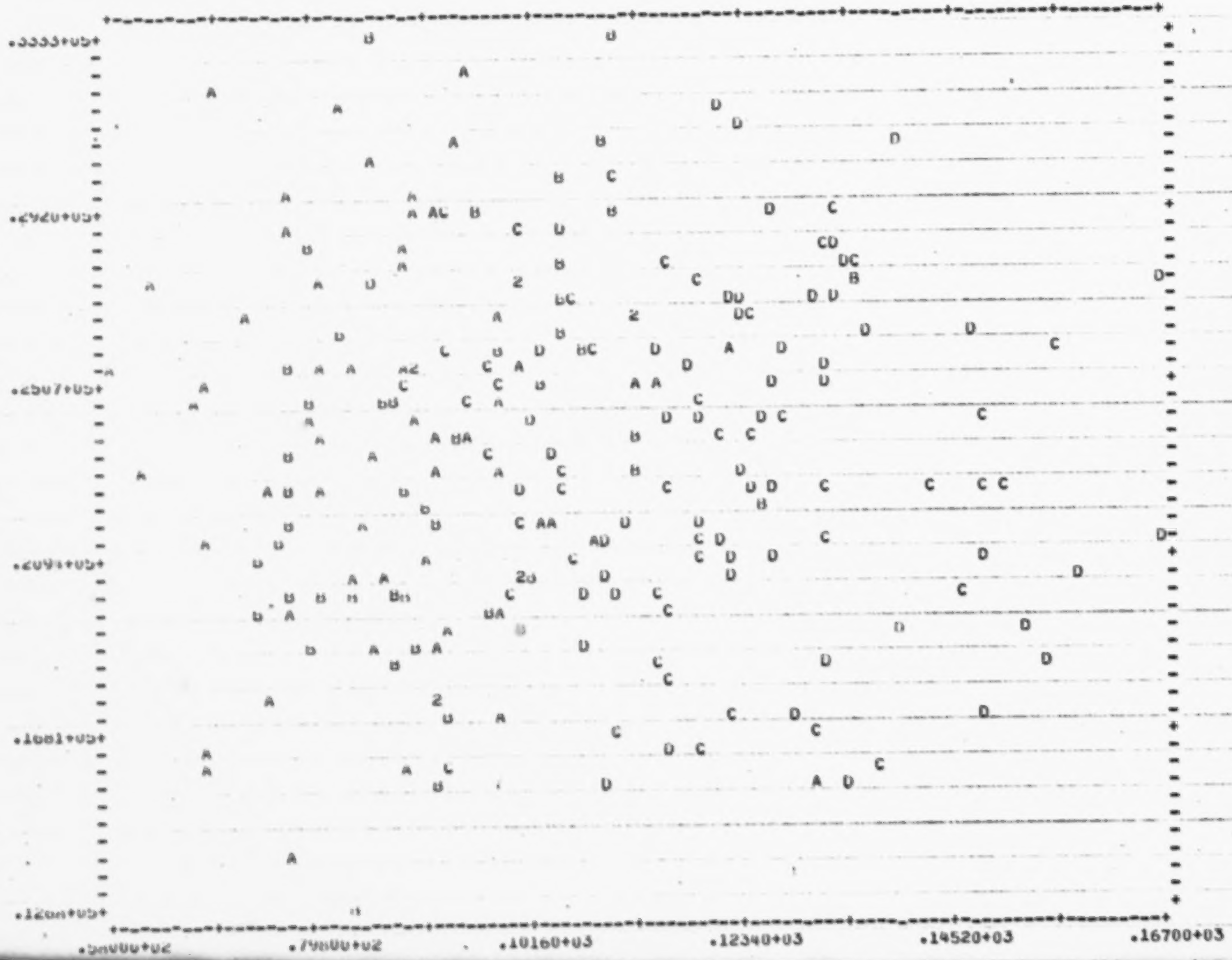
COMPOSITE STANDARD SCORES



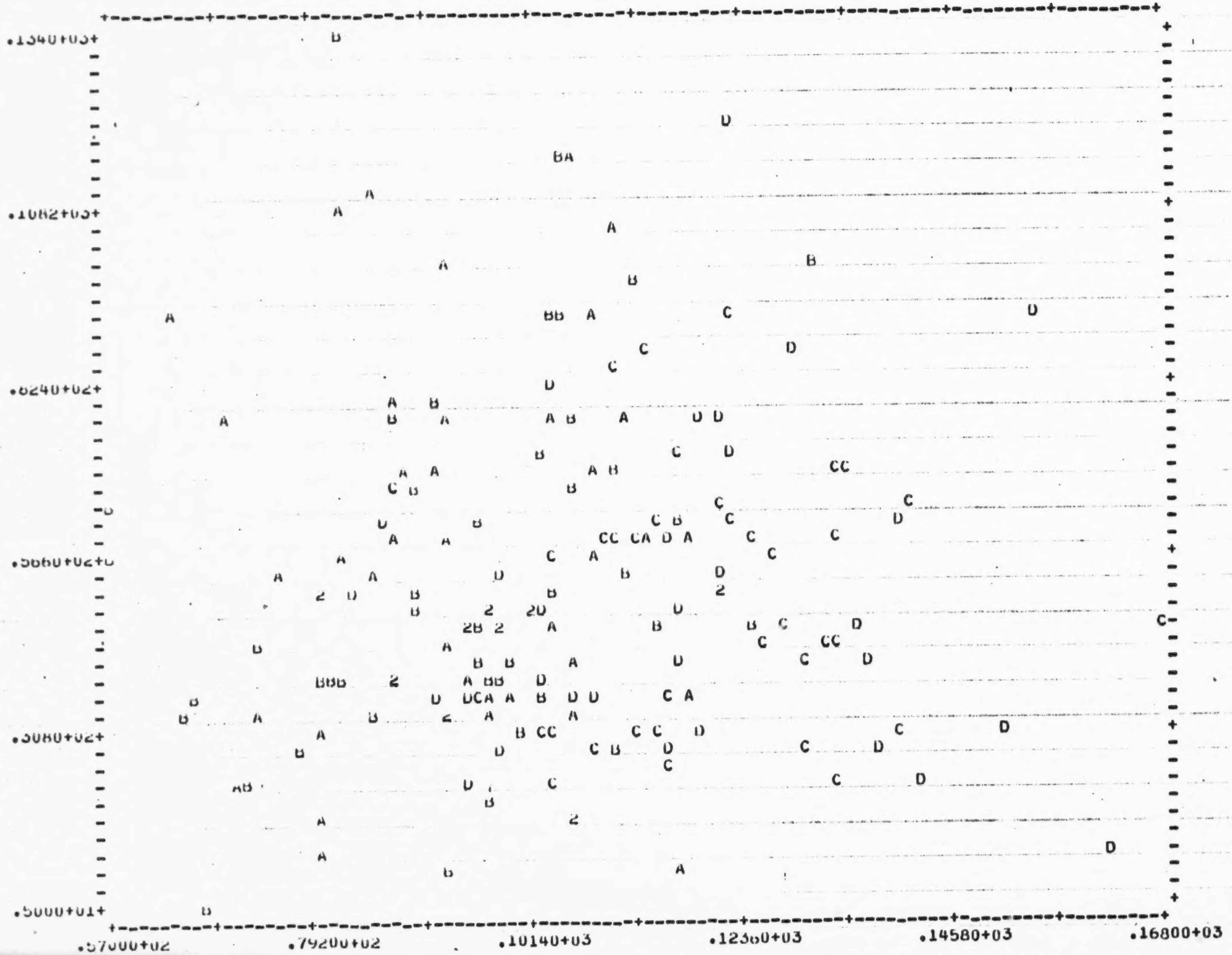
APPENDIX I

SCATTER DIAGRAMS FOR VERBAL CREATIVITY, PPVT, SEX, AND SOCIO-ECONOMIC STATUS

The symbols used in the scatter diagrams are as follows: A = female low socio-economic status; B = male low socio-economic status; C = female high socio-economic status; and D = male high socio-economic status.

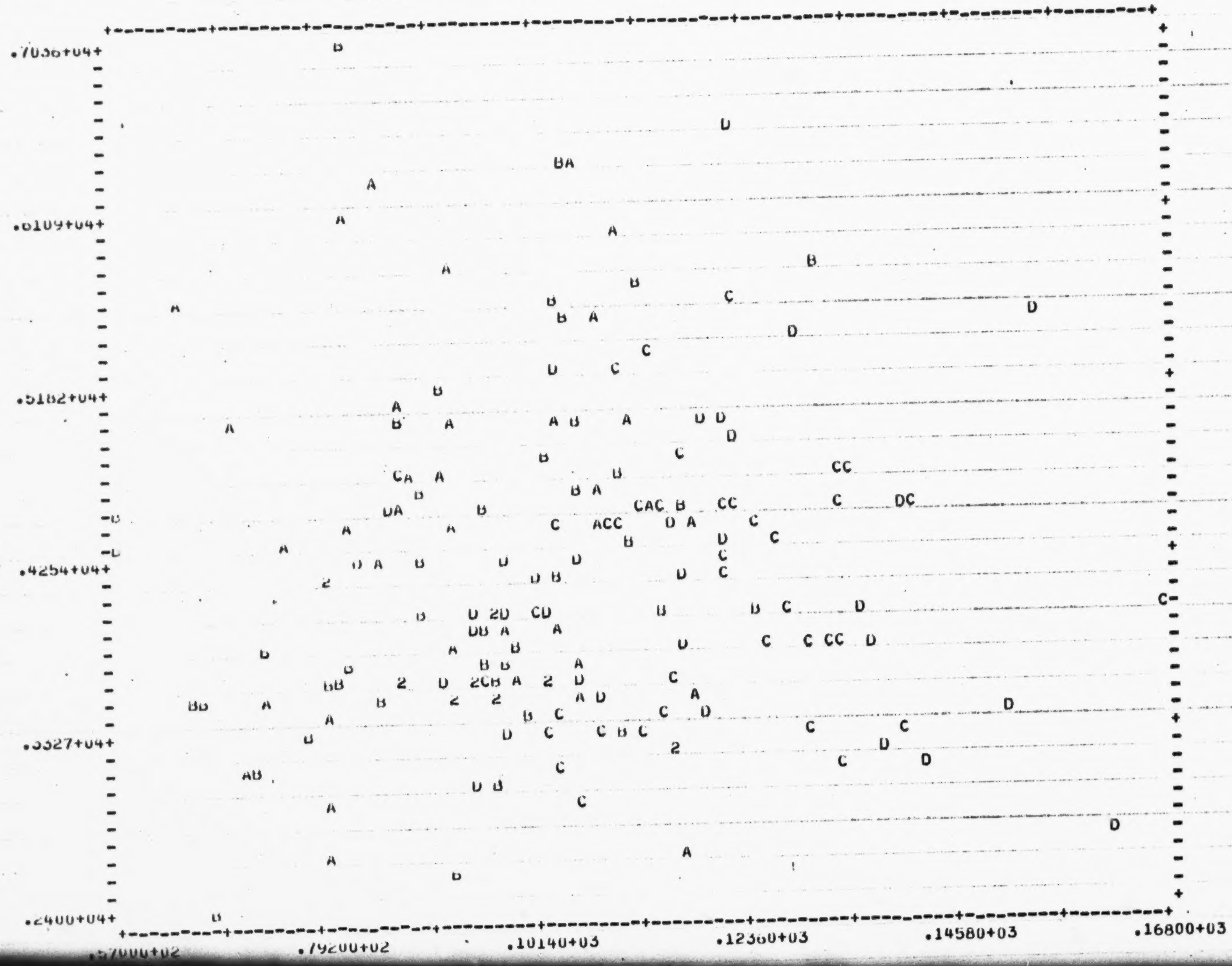
VERBAL FIRST GRADE

FLUENCY RAW SCORES



VERBAL FIRST GRADE

FLUENCY STANDARD SCORES



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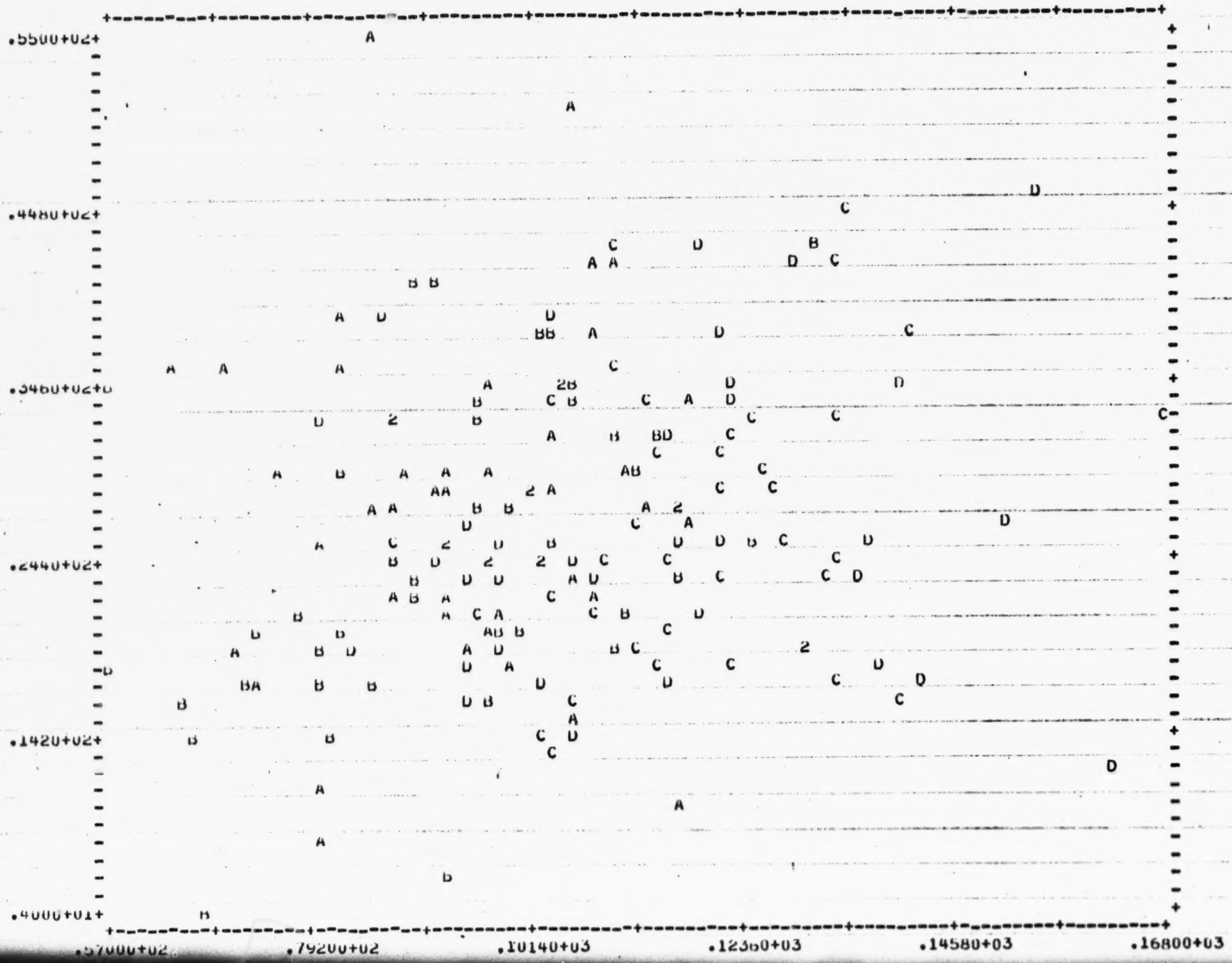

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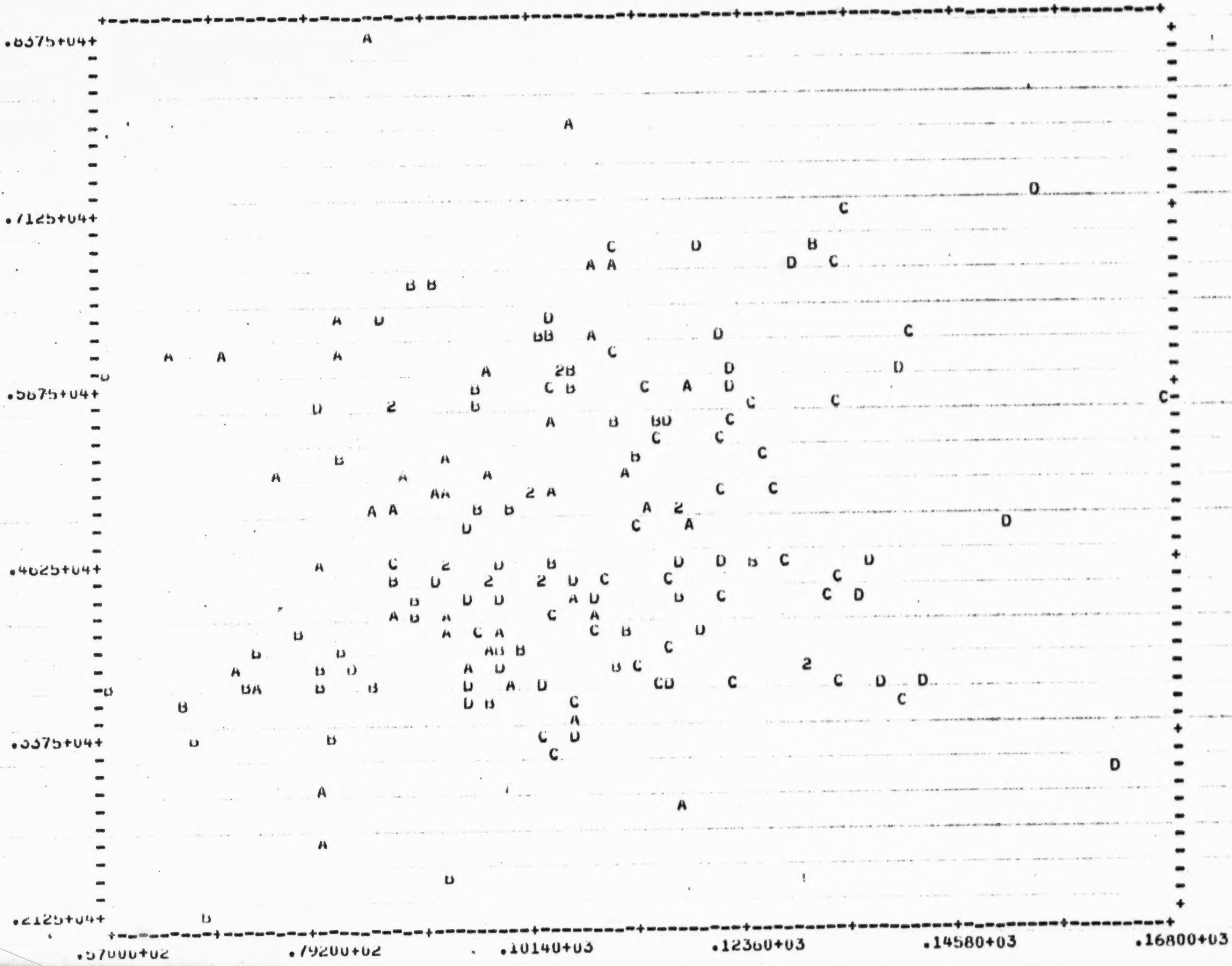
FLEXIBILITY STANDARD SCORES



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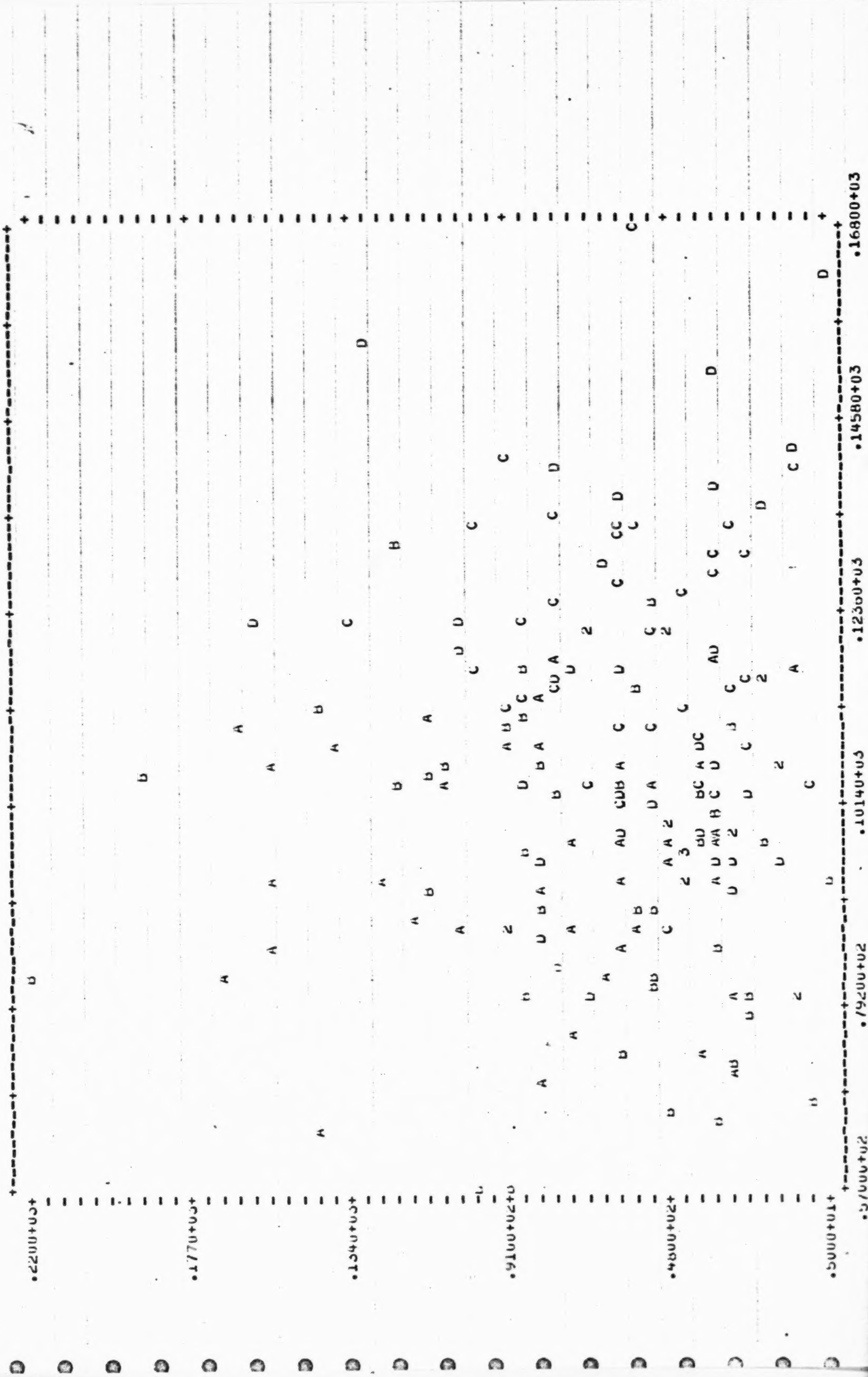

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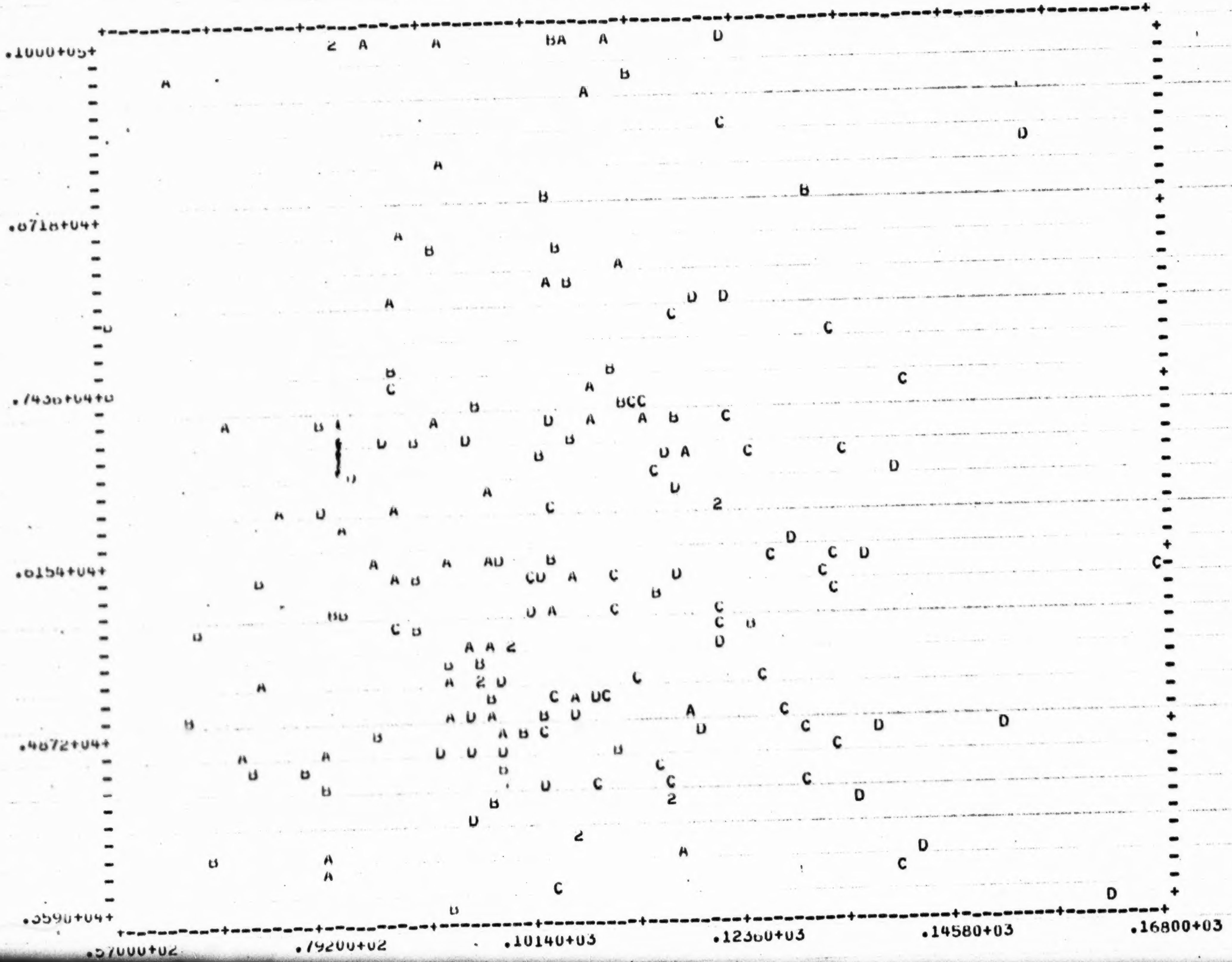

VERBAL FIRST GRADE

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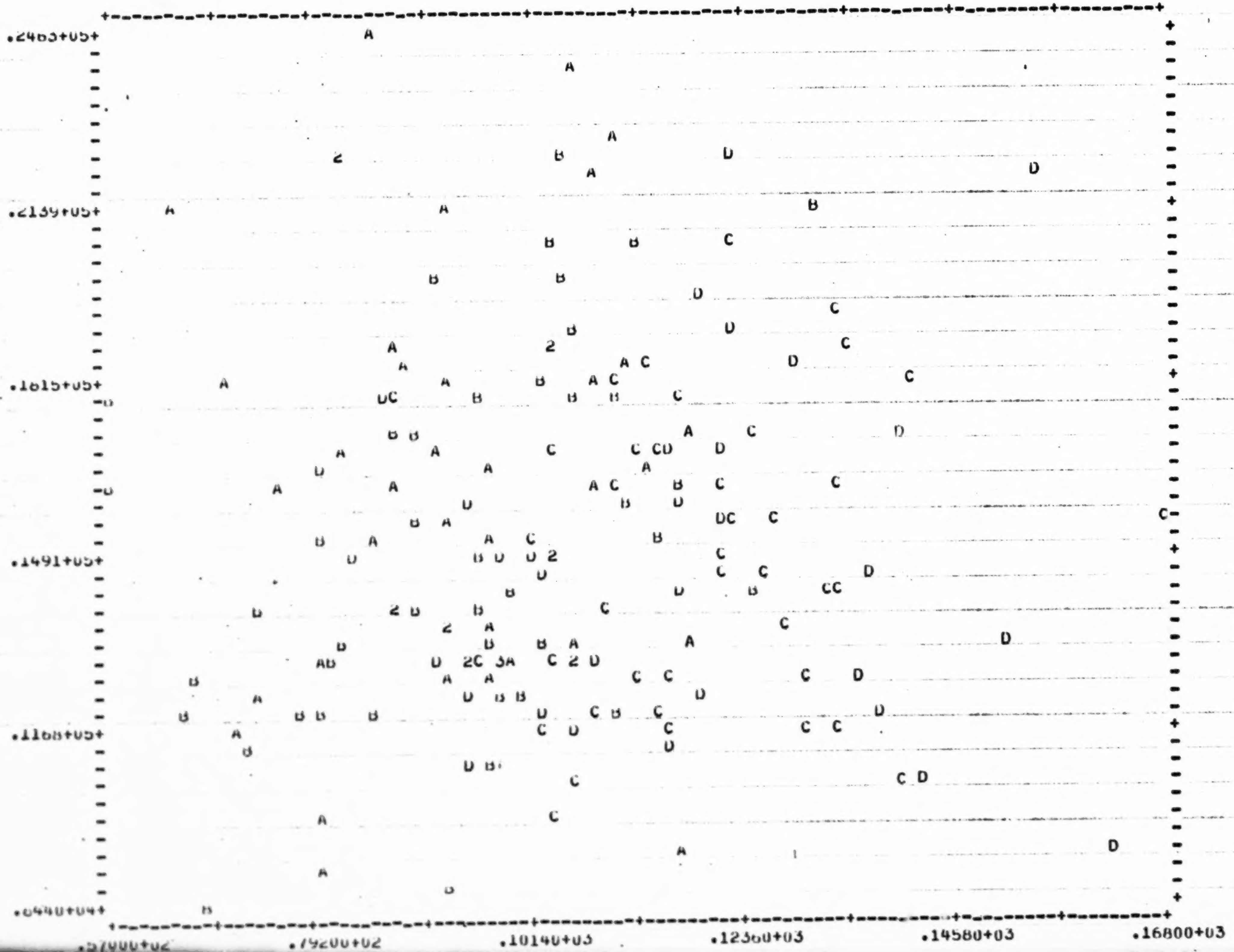

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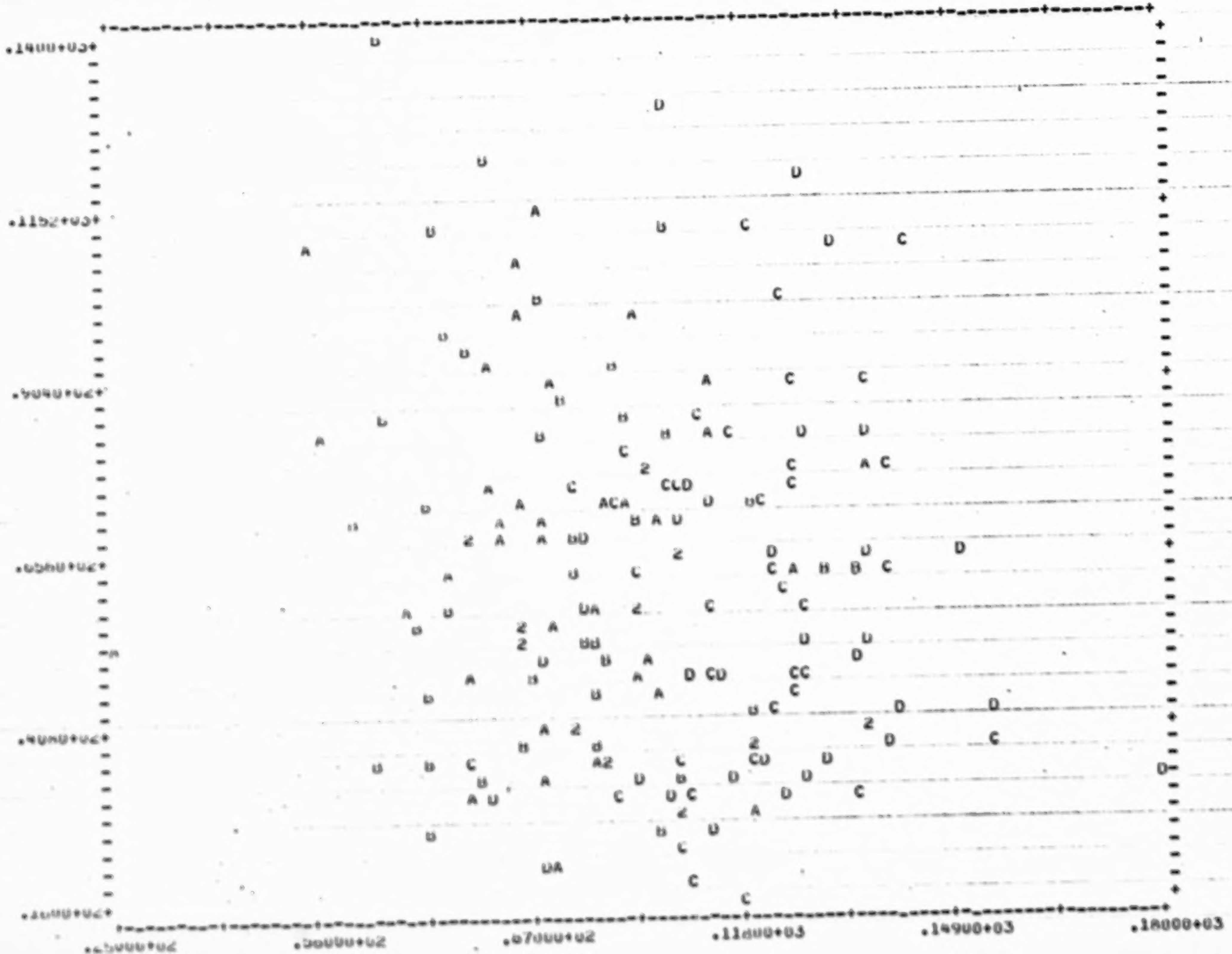
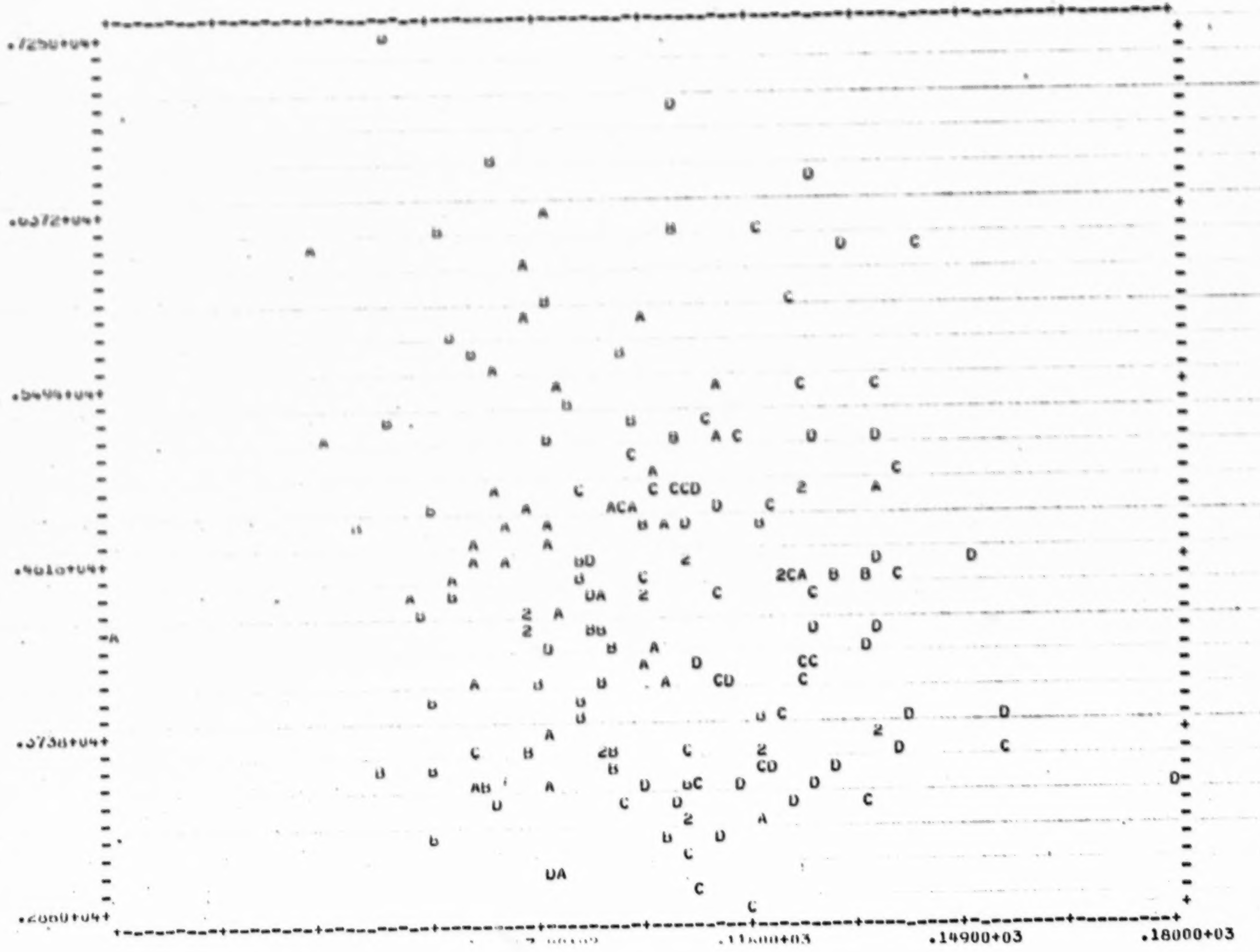


VERBAL THIRD GRADE FLUENCY STANDARD SCORES



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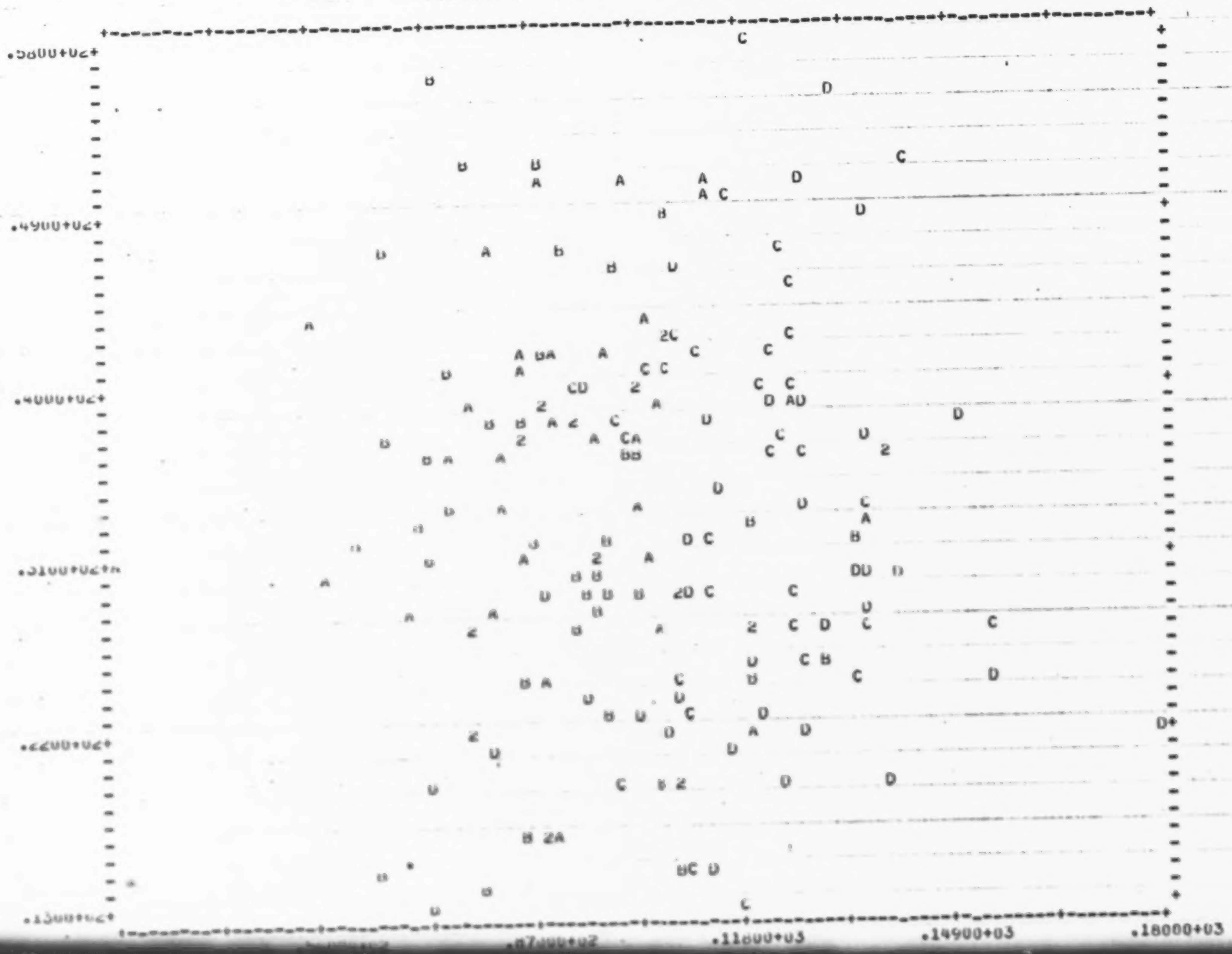

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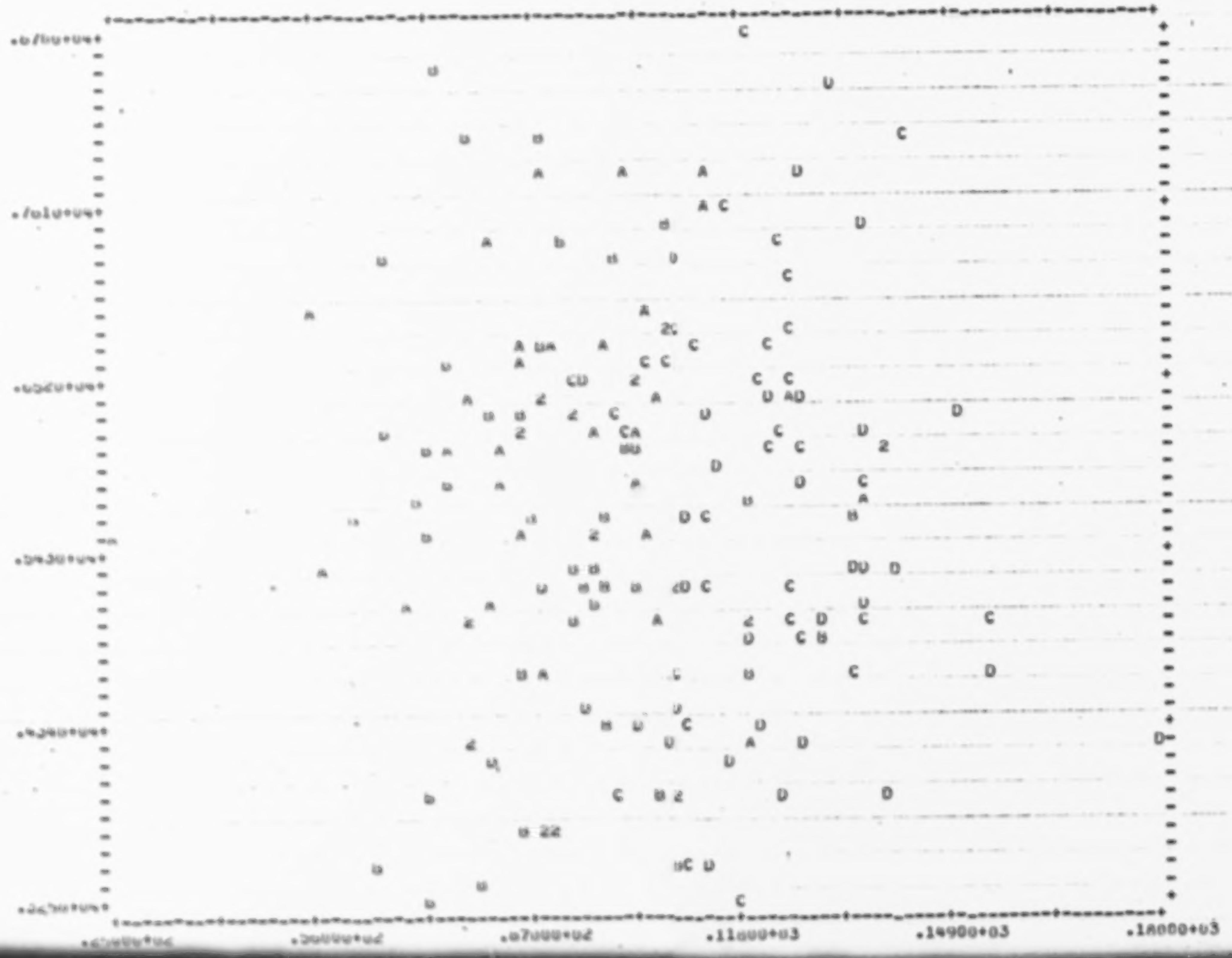

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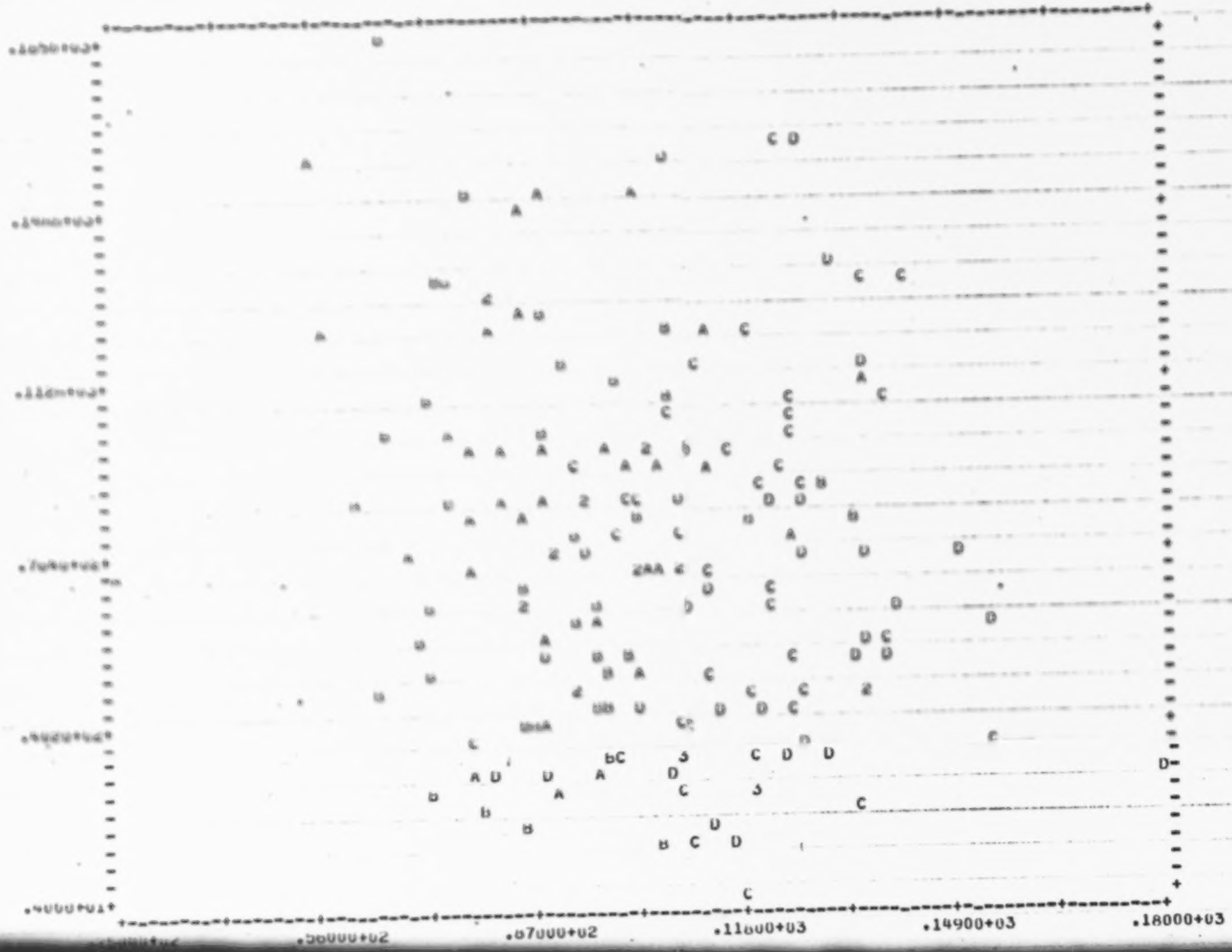

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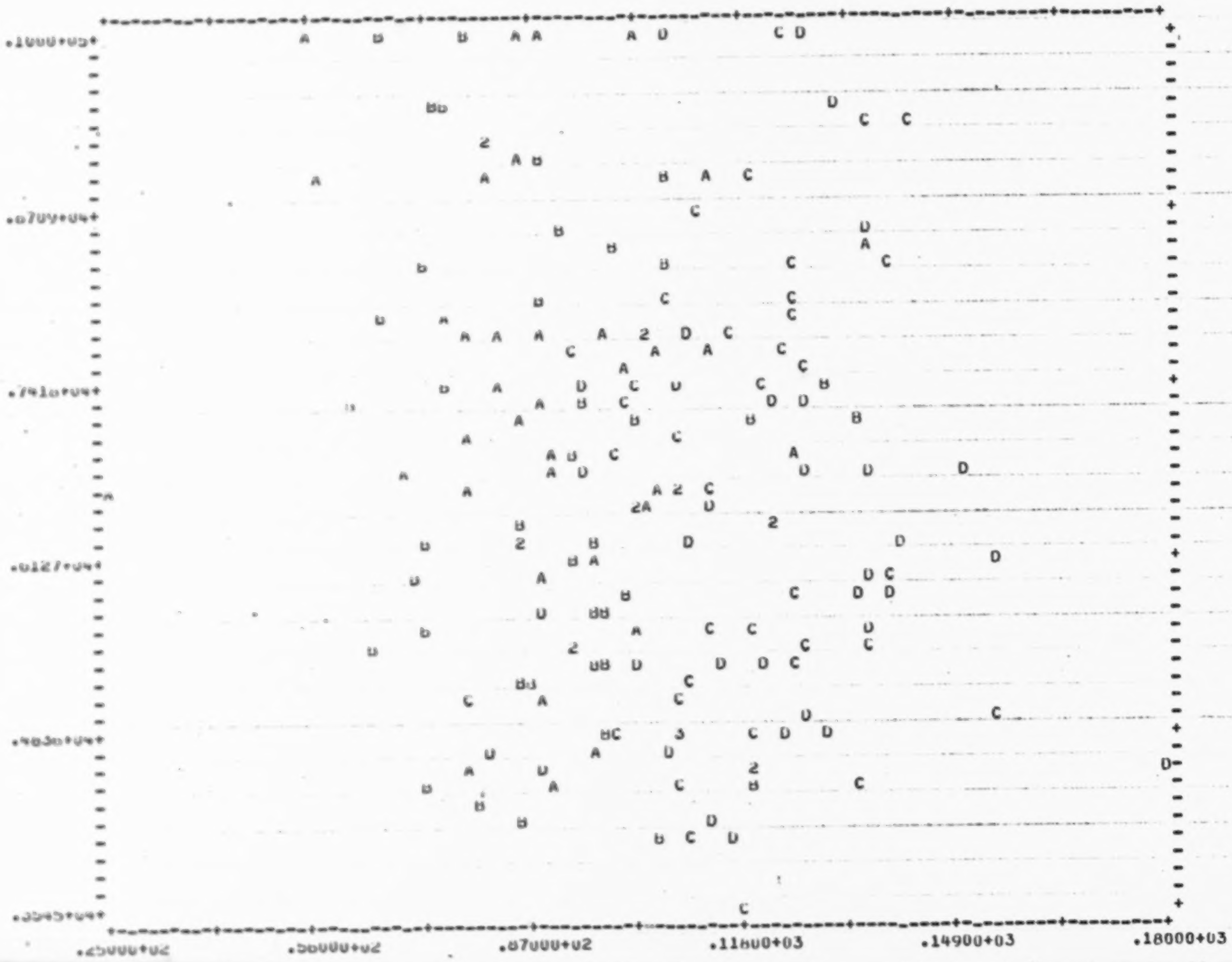
ORIGINALITY STANDARD SCORES



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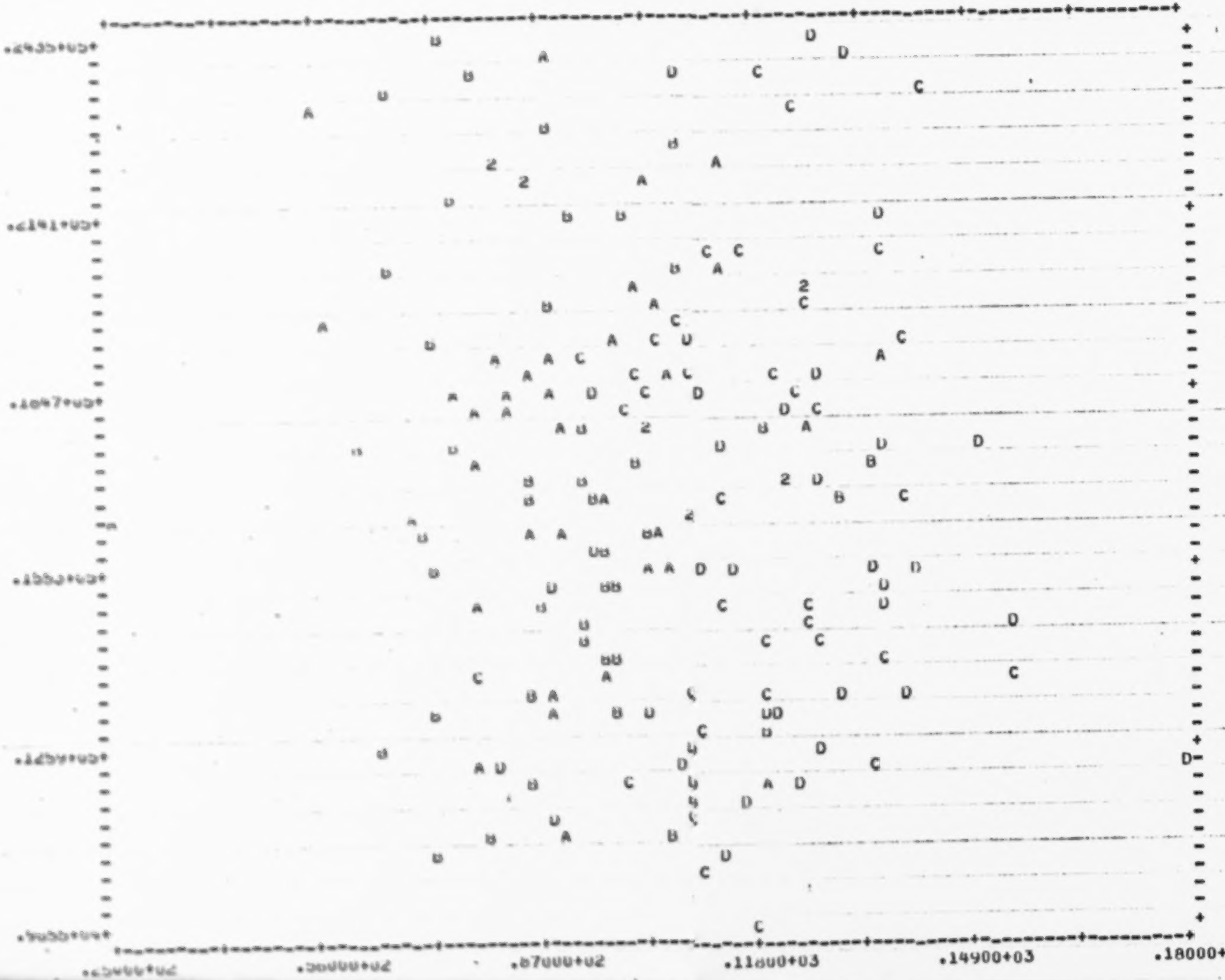
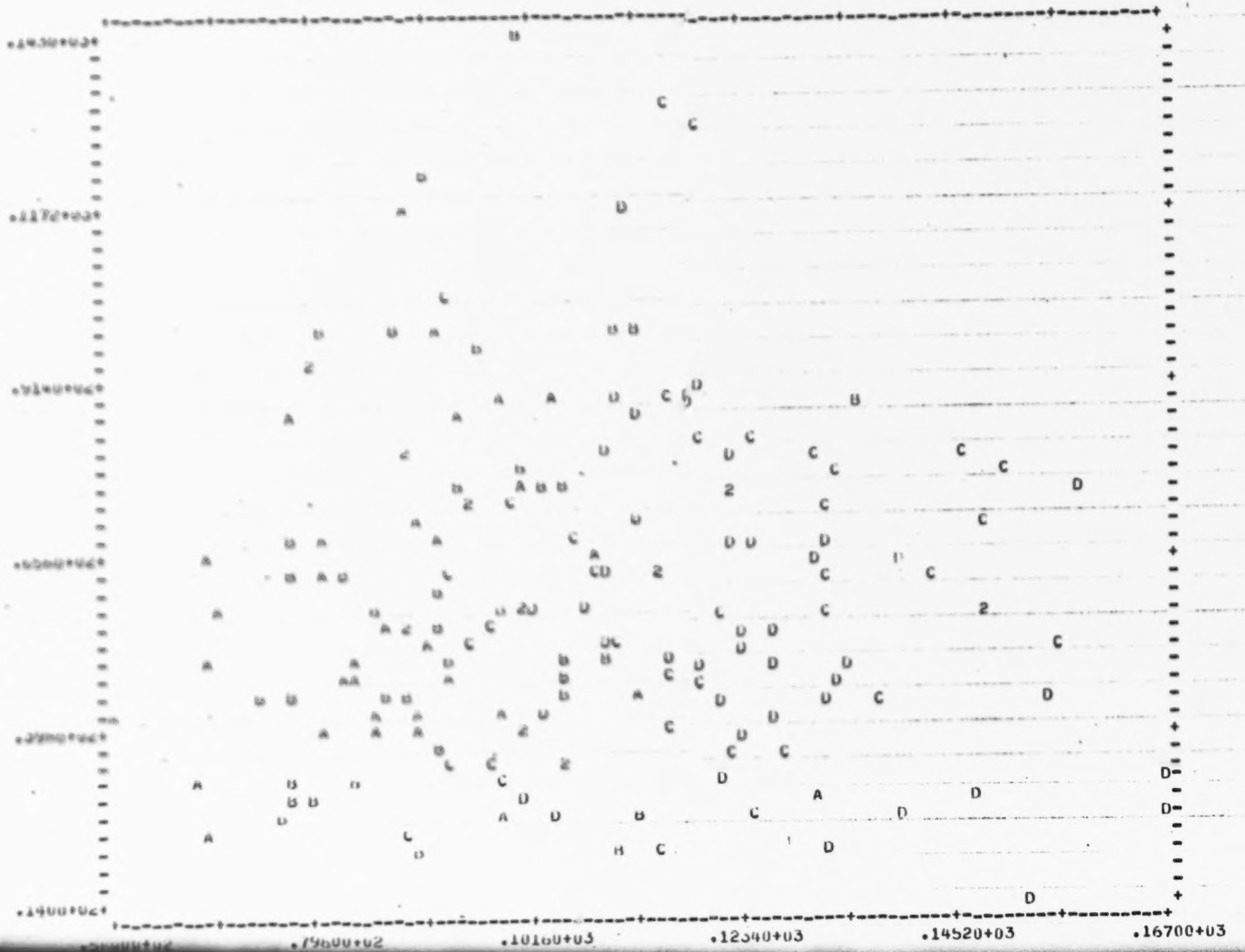
COMPOSITE STANDARD SCORES



VERBAL FIFTH GRADE

FLUENCY RAW SCORES



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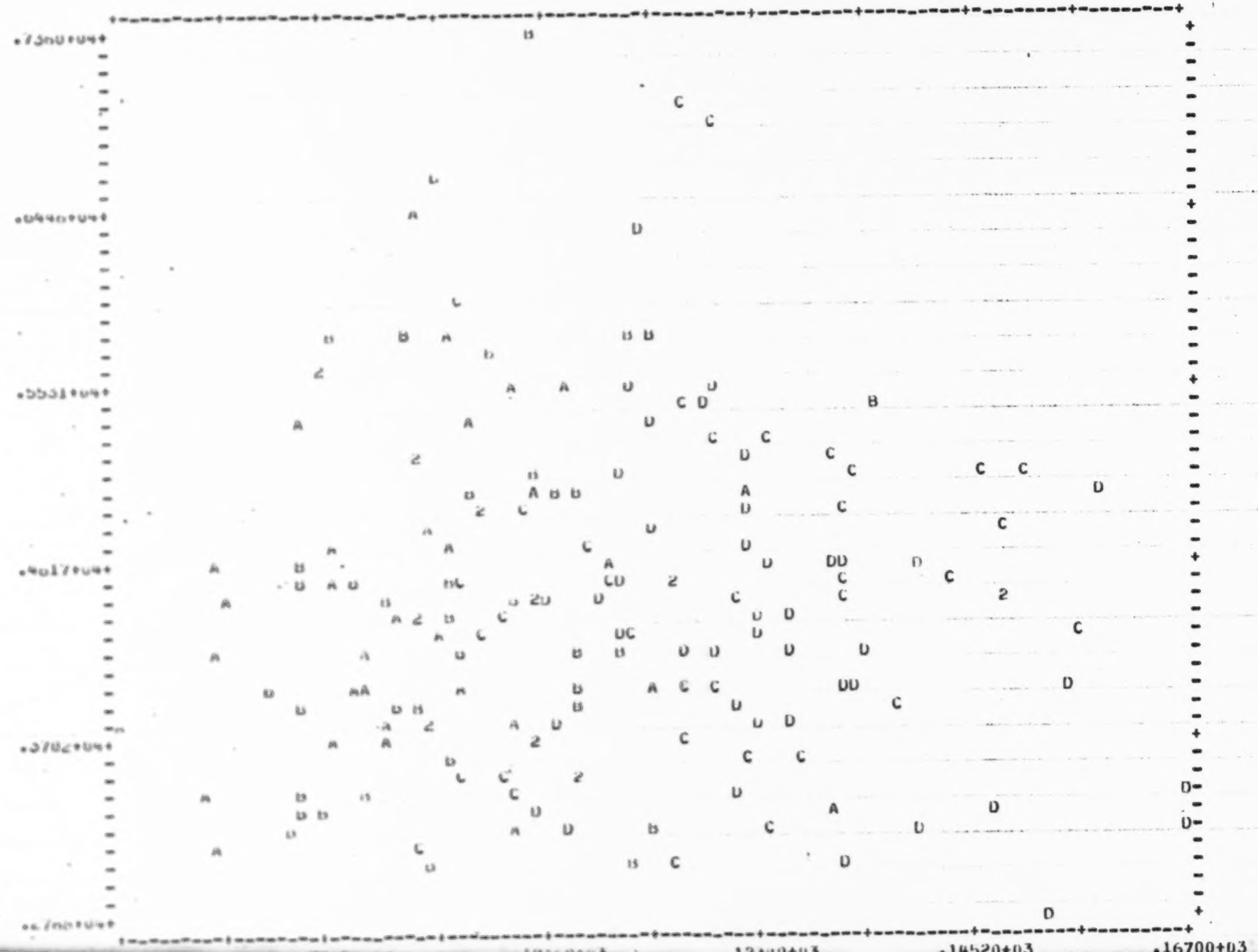
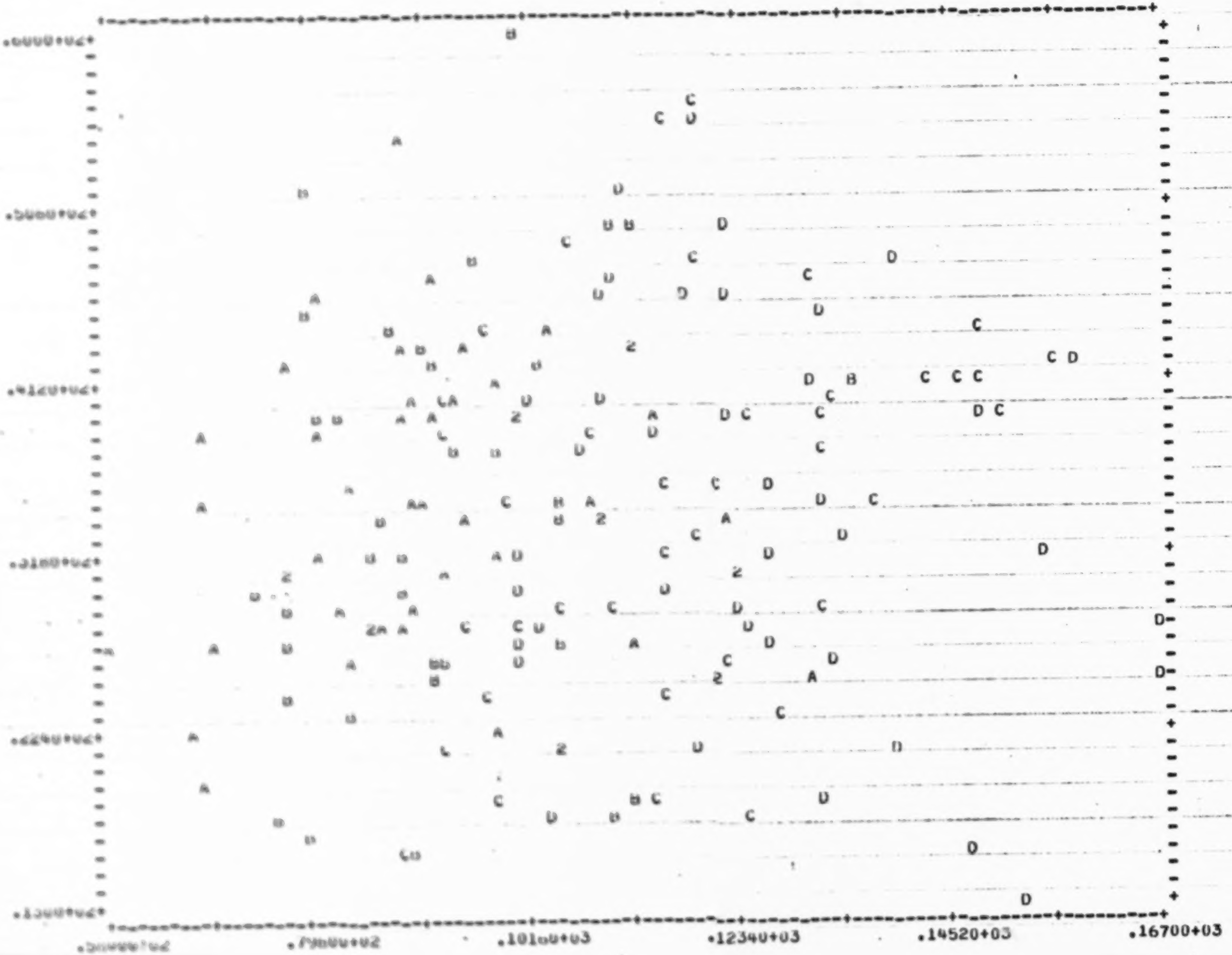
FLUENCY STANDARD SCORES



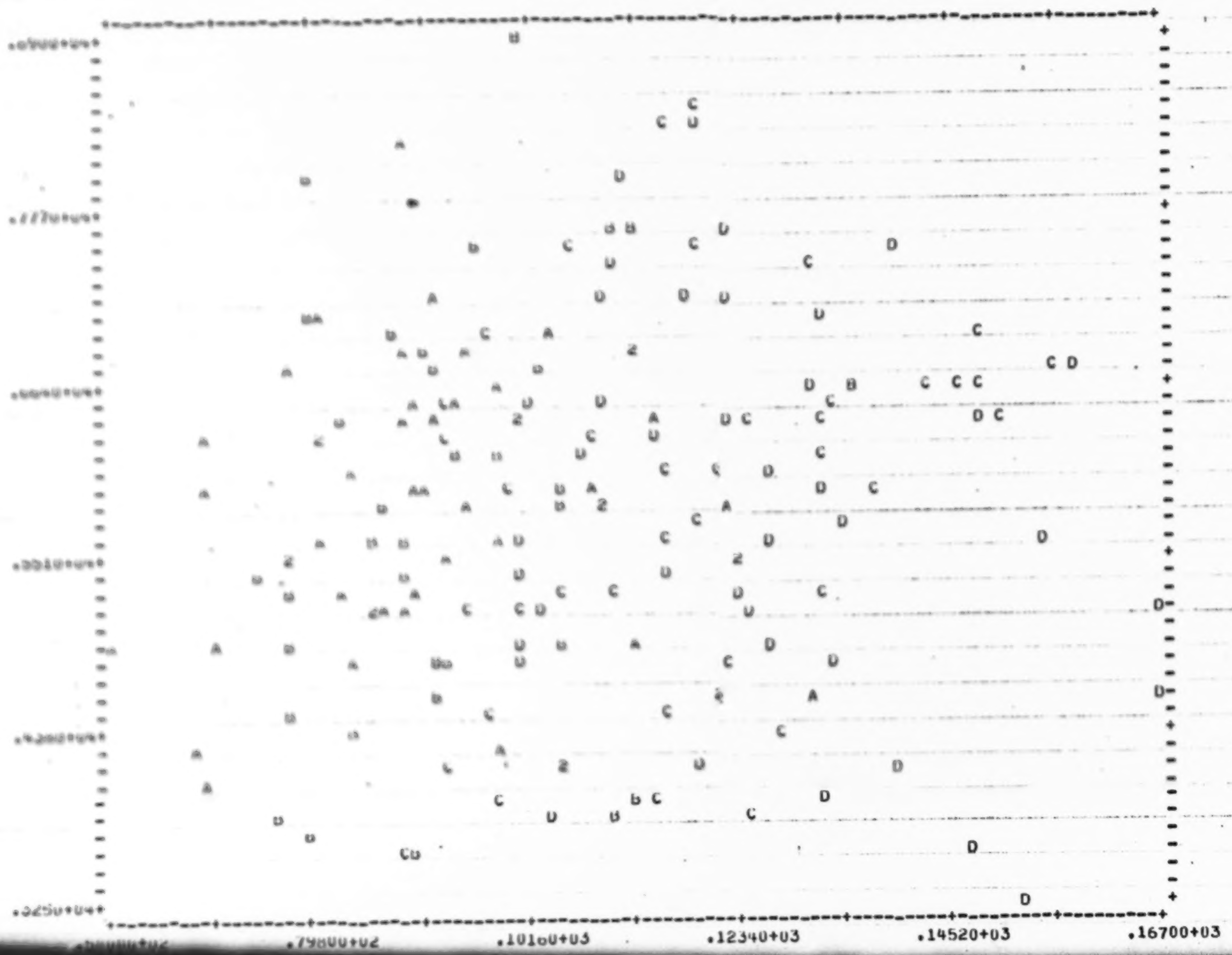
VERBAL FIFTH GRADE

FLEXIBILITY RAW SCORES



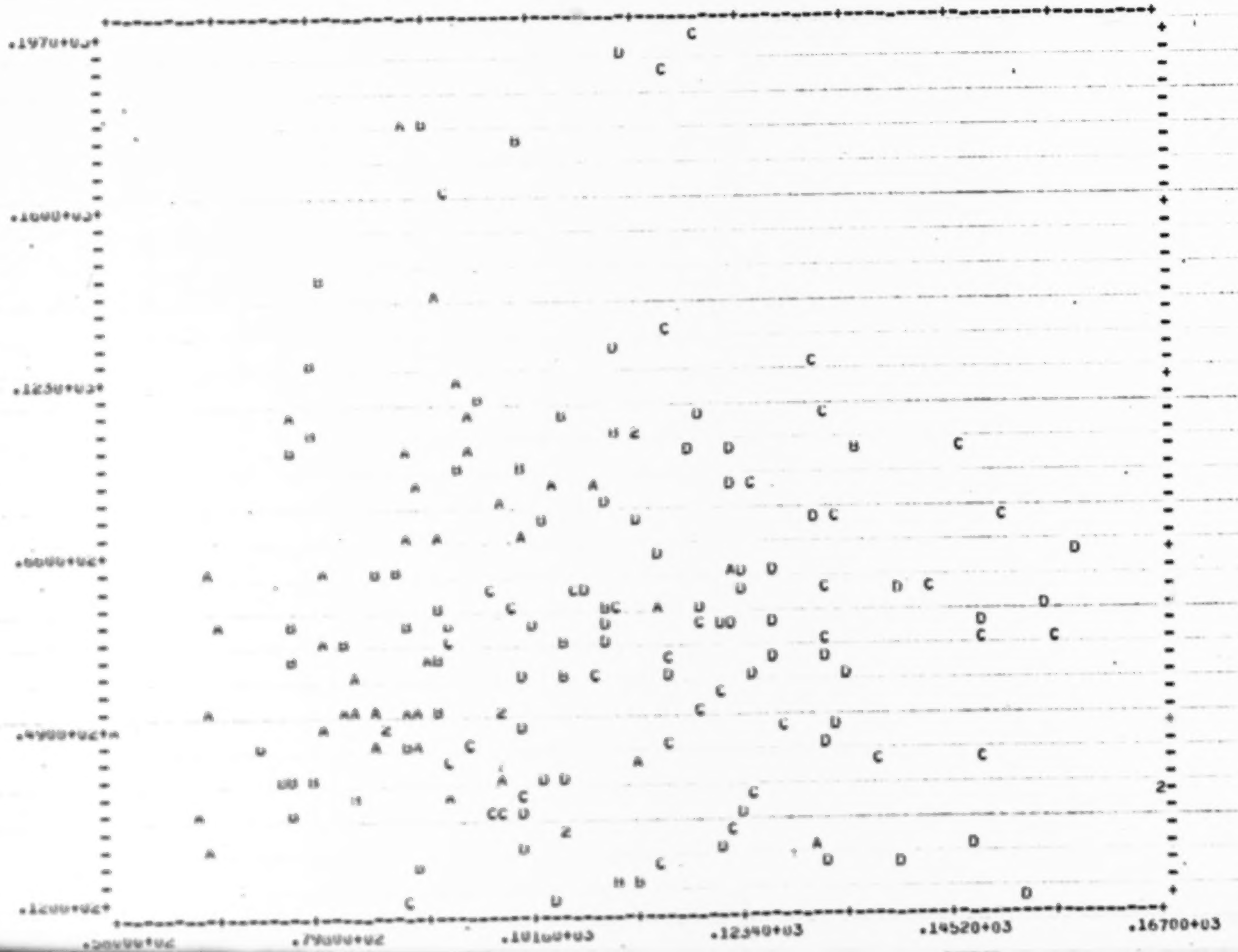
VERBAL FIFTH GRADE

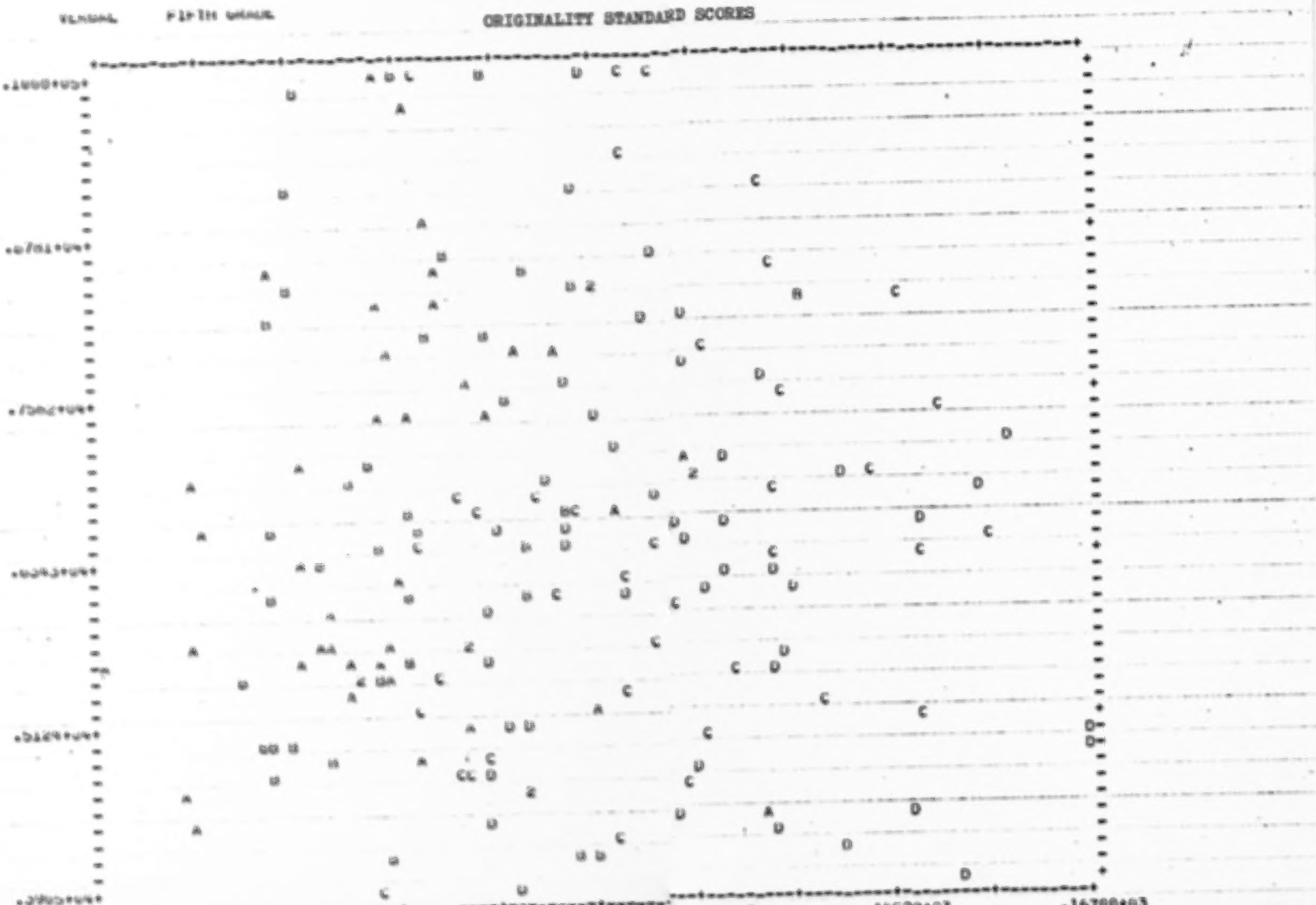
FLEXIBILITY STANDARD SCORES

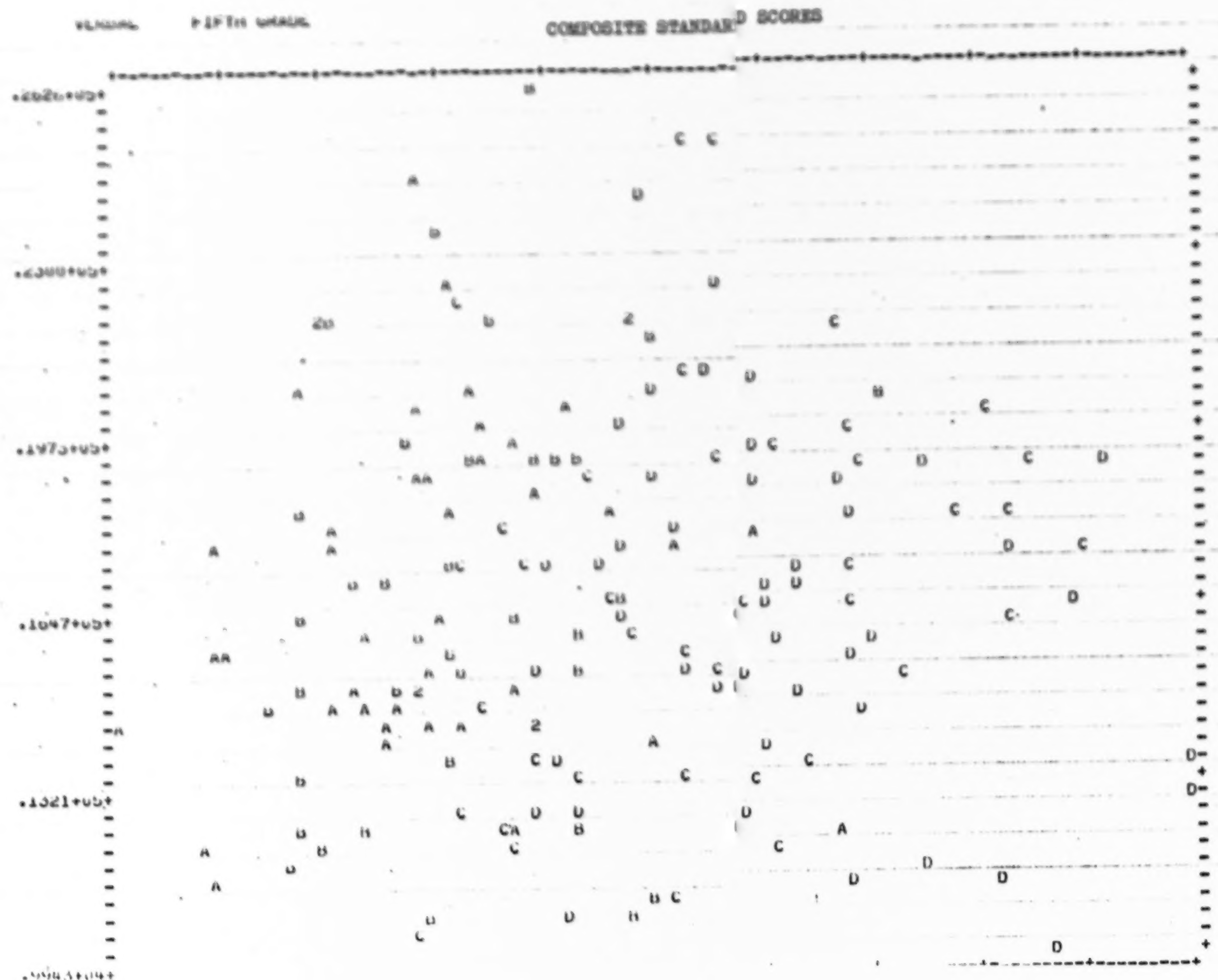


VERBAL FIFTH GRADE

ORIGINALITY RAW SCORES




VERBAL
FIFTH GRADE
ORIGINALITY STANDARD SCORES
.1000+05


VERBAL
FIFTH GRADE
COMPOSITE STANDARD SCORES
.2626+05
.2300+05
.1973+05
.1647+05
.1321+05
.9943+04

APPENDIX J

FURTHER TEST PROCEDURES

Comparison Group Norms

For all subproblems, the creativity tests were scored, and the raw scores were converted to standard scores.[1] (See sample data sheet, Appendix B.) The means and standard deviations were then computed, separately, for verbal and figural performance (expressed as raw scores and as standard scores) for three grade levels, i.e., first, third, and fifth grades. These means and standard deviations were obtained for the following sixteen dimensions of creative thinking: (1) verbal fluency (raw scores), (2) verbal fluency (standard scores), (3) verbal flexibility (raw scores), (4) verbal flexibility (standard scores), (5) verbal originality (raw scores), (6) verbal originality (standard scores), (7) composite verbal creative thinking (standard scores), (8) figural fluency (raw scores), (9) figural fluency (standard scores), (10) figural flexibility (raw scores), (11) figural flexibility (standard scores), (12) figural originality (raw scores), (13) figural originality (standard scores), (14) figural elaboration

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[1] E. Paul Torrance, Torrance Tests of Creative Thinking (Princeton, New Jersey: Personnel Press, Inc., 1966.

(raw scores), (15) figural elaboration (standard scores), and (16) composite figural creative thinking (standard scores). The means and standard deviations of these dimensions were listed in Tables XX and XXI, along with the means and standard deviations of intelligence, as measured by the Peabody Picture Vocabulary Test (PPVT).

The standard deviations in Table XX indicated a wide spread of scores on the dimension of figural originality, expressed as raw scores and as standard scores (columns Y_{c5} and Y_{c6}) and on the dimension of figural elaboration, expressed as raw scores and as standard scores (columns Y_{c7} and Y_{c8}).

The standard deviations in Table XXI indicated a wide spread of scores on the dimension of verbal fluency, expressed as raw scores (column Y_{c1}) and on the dimension of verbal elaboration, expressed as raw scores and as standard scores (columns Y_{c7} and Y_{c8}).

The means and standard deviations of scores on creative thinking tasks were compared to those obtained by Torrance[2] (comparison tables appear in Appendix J). As in the present study, the major comparison groups reported by Torrance represented the sampling of a large school system, drawing from a wide range of socio-economic levels. Norms

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[2] Ibid., pp. 62, 64, 65, and 66.

TABLE XX

MEANS AND STANDARD DEVIATIONS FOR FLUENCY, FLEXIBILITY, ORIGINALITY (RAW AND STANDARD SCORES) AND COMPOSITE CREATIVITY (STANDARD SCORES), VERBAL CREATIVITY FORM A, AND PPVT (SELECTED ELEMENTARY SCHOOLS IN THE DISTRICT OF COLUMBIA)

Grade	N	Age in months	PPVT IQ	Fluency		Flexibility		Originality		Composite Creativity
				Raw Scores	Standard Scores	Raw Scores	Standard Scores	Raw Scores	Standard Scores	Standard Scores
				Y_{c1}	Y_{c2}	Y_{c3}	Y_{c4}	Y_{c5}	Y_{c6}	Y_{c9}**
First	167									
Mean		72	104	52.61	41.80	26.40	48.63	65.07	62.35	50.93
S.D.		7.63	20.41	24.335	8.568	8.929	11.147	39.150	16.172	11.176
Third	166									
Mean		106	104	61.88	44.99	33.26	56.96	75.96	67.49	56.48
S.D.		8.26	22.96	25.555	8.970	9.946	12.206	37.73	16.345	11.868
Fifth	167									
Mean		128	107	59.41	44.15	34.12	58.18	72.29	65.48	55.94
S.D.		8.05	22.37	24.358	8.570	9.613	11.701	38.067	15.433	11.320

**Y_{c7} and Y_{c8}, elaboration raw and standard scores, are in the figural test only.

TABLE XXI

MEANS AND STANDARD DEVIATIONS FOR FLUENCY, FLEXIBILITY, ORIGINALITY, ELABORATION (RAW AND STANDARD SCORES), AND COMPOSITE CREATIVITY (STANDARD SCORES), FIGURAL CREATIVITY FORM A, AND PPVT (SELECTED ELEMENTARY SCHOOLS, DISTRICT OF COLUMBIA)

Grade	N	Age in months	PPVT IQ	Fluency		Flexibility		Originality		Elaboration		Composite Creativity
				Raw Scores	Standard Scores	Raw Scores	Standard Scores	Raw Scores	Standard Scores	Raw Scores	Standard Scores	
				Y_{c1}	Y_{c2}	Y_{c3}	Y_{c4}	Y_{c5}	Y_{c6}	Y_{c7}	Y_{c8}	Y_{c9}
First	241											
Mean		82	104	23.40	49.52	16.97	51.16	34.92	59.87	71.85	55.51	54.01
S.D.		6.95	20.96	6.924	9.911	5.236	9.826	12.958	14.590	36.948	16.394	9.446
Third	264											
Mean		107	101	24.12	50.75	17.48	52.09	34.63	60.45	77.70	58.41	55.43
S.D.		8.75	23.39	7.947	11.809	5.037	9.391	15.832	17.585	33.910	15.342	10.400
Fifth	217											
Mean		129	105	24.26	50.79	18.19	53.49	36.13	62.37	101.03	68.17	58.71
S.D.		8.16	22.52	7.603	11.195	4.848	9.142	14.620	16.608	43.811	17.765	10.487

groups presented by Torrance provided data for grades four through twelve on *Verbal Form A*, as shown in Table XXII. No normative data were reported in the *Manual* for grades one through three, and data from the present study could not be compared to these groups. Hence, by means of the present study, a contribution has been made to the normative data collected in these early years for the benefit of further research in the area of creativity, Table XXIII.

Analysis of the Results on the Peabody Picture Vocabulary Test

The mean IQ (*PPVT*), as was noted in Tables XX and XXI, was 104 for two groups taking both verbal and figural tests on the first grade level; was 104 for two groups taking both verbal and figural tests on the third grade level; and was 102 for two groups taking both verbal and figural tests on the fifth grade level. Standard deviations indicated that there was a wide spread in IQ scores. These scores range from an IQ of 56 to an IQ of 180 on the *PPVT*.

In order to establish further the validity of the *Peabody Picture Vocabulary Test* as a true measure of "a subject's verbal intelligence through measuring his hearing vocabulary," the researcher correlated four other groups of test scores, from tests that appeared to measure capability similar to that measured by the *Peabody Picture Vocabulary*

TABLE XXII

MEANS AND STANDARD DEVIATIONS OF FLUENCY, FLEXIBILITY, AND ORIGINALITY SCORES FOR VERBAL FORM A OF THE *TORRANCE TESTS OF CREATIVE THINKING* FOR SELECTED GROUPS*

Group	Number	Fluency		Flexibility		Originality	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Fourth Grade (Calif.)	78	68.7	27.4	29.4	7.3	32.3	18.6
Fifth Grade (Calif.)	69	79.5	33.1	34.2	10.4	48.6	25.7
Sixth Grade (Calif.)	63	61.2	28.9	27.3	9.2	44.3	17.6
Seventh Grade (Calif.)	103	85.3	33.8	37.5	10.6	57.1	21.6
Eighth Grade (Calif.)	154	85.8	29.0	37.7	10.2	56.3	28.1
Ninth Grade (Calif.)	58	62.2	20.2	31.7	8.0	34.2	20.6
Tenth Grade (Calif.)	65	94.6	32.5	40.2	9.0	45.2	23.2
Eleventh Grade (Calif.)	64	58.3	22.9	31.9	10.2	31.2	17.3
Twelfth Grade (Calif.)	37	81.7	30.1	36.7	10.6	66.3	40.3
Fourth Grade (Wis.)	33	78.4	29.2	29.4	10.1	29.3	21.5
Fifth Grade (Wis.)	118	77.5	26.0	27.0	8.4	37.2	20.4
Sixth Grade (Wis.)	42	87.2	39.5	31.9	9.7	48.9	31.6
Fifth Grade (St. Paul Suburban	54	51.7	27.6	23.1	7.7	37.6	21.6

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*E. Paul Torrance, Manual, *op*. *cit*., p. 66.

TABLE XXIII

MEANS AND STANDARD DEVIATIONS FOR ALL THREE TESTS COMBINED FOR FIGURAL FORM A FOR GRADES 1 THROUGH 12 IN SCHOOL SYSTEM A (CALIFORNIA)*

Grade	Number	Fluency		Flexibility		Originality		Elaboration	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
First	68	23.9	7.2	19.2	5.6	29.2	11.3	27.7	10.5
Second	79	27.7	6.0	20.3	4.9	32.6	11.5	44.1	19.9
Third	79	20.5	9.5	15.0	6.2	24.8	12.8	53.5	22.5
Fourth	86	24.5	6.5	18.3	5.4	29.1	10.2	46.8	15.0
Fifth	67	21.6	7.9	16.0	5.2	33.3	15.1	85.1	38.3
Sixth	61	20.3	6.3	16.6	4.9	28.3	10.9	47.9	18.5
Seventh	109	19.5	6.7	14.5	4.9	26.3	9.5	73.2	34.3
Eighth	113	20.2	7.1	16.3	5.4	29.6	12.2	68.4	29.5
Ninth	60	16.8	5.3	13.8	4.1	23.3	9.0	40.1	16.5
Tenth	68	19.7	5.5	15.4	3.9	27.2	9.0	58.8	29.0
Eleventh	67	15.2	6.8	12.5	5.1	21.5	8.9	36.9	15.1
Twelfth	67	18.4	6.3	16.1	5.5	30.0	11.7	47.0	18.0

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*E. Paul Torrance, Manual, op. cit., p. 60.

Test scores. Results, as shown in Table XXIV, indicated the *Word Knowledge* subtest of the *Metropolitan Achievement Test*, given regularly in the third grade, correlated higher with the *Peabody Picture Vocabulary Test* (r = .67) than the *Metropolitan Reading Readiness Test*, administered in kindergarten; the *Science Research Associates Test*, administered in the first grade; and the *Word Knowledge* subtest of the *Stanford Achievement Test*, administered in the fifth grades. Significant correlations were found, however, between the *Stanford Achievement Word Knowledge* subtest (r = .52) and between the *Science Research Associates Test* (r = .43), and the *Peabody Picture Vocabulary Test* and intelligence tests were reported in Chapter III of this research.

TABLE XXIV

OTHER TESTS CORRELATED WITH THE PPVT

Grade	Peabody Picture Vocabulary Test	
	r*	N**
First		
Metropolitan Reading Readiness Test (Kindergarten)	.31	119
Science Research Associates (First)	.43	29
Third		
Metropolitan Achievement Test (Word knowledge)	.67	120
Fifth		
Stanford Achievement Test (Word knowledge)	.52	83

*r = correlation.
**N = number of subjects.